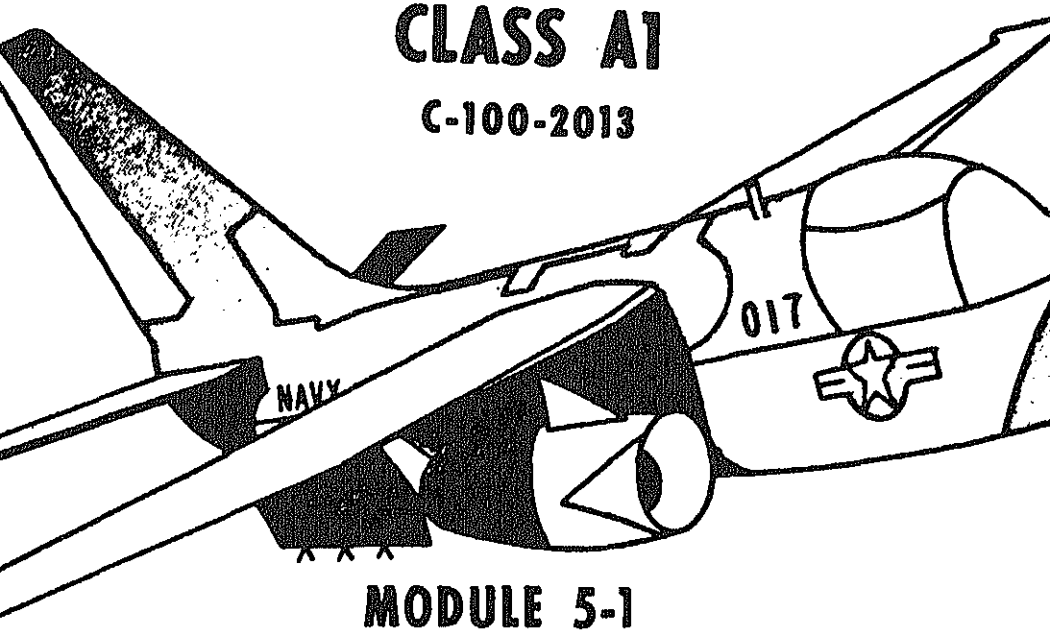
AVIONICS TECHNICIAN COURSE

CLASS A1

C-100-2013



MODULE 5-1

MIMS AND SECURITY OF SYSTEMS IN AIRCRAFT

CNTT-M1186 (REV. 8-84)

PREPARED BY
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MILLINGTON, TENNESSEE

PREPARED FOR

AVIONICS TECHNICIAN COURSE, CLASS A1

UNIT 5

MODULE 1

LESSON TOPIC 1

PURPOSE AND FORMAT OF MAINTENANCE INSTRUCTION MANUALS

LESSON TOPIC 5-1-1

PURPOSE AND FORMAT OF MAINTENANCE INSTRUCTION MANUALS

his lesson topic you will study the purpose and format
Maintenance Instruction Manual (MIM) as used in an
ating ship or squadron of the U. S. Navy. You should
oughly understand the purpose and format of the Table c
ents, List of Illustrations, List of Tables, and the
rmation contained in the five sections of the MIM.

learning objectives for this lesson topic are as follows

Given a list of statements, select the statement which
correctly describes the purpose of a Maintenance Instruc
tion Manual (MIM).

Select from a list, the parts of the MIM that provide the
listing of paragraph numbers, figure numbers, table
numbers, and page numbers.

Select from a list of statements, the information contai
in the Introduction Section of the MIM.

Select from a list, the types of information contained
in the Description and Operation Section of the MIM.

Select from a list, the information you would not
look for in the Organizational Maintenance Section of
the MIM.

Select from a list, the information contained in the
Intermediate Maintenance Section of the MIM.

Select, from a list of items, the information contained
in the Charts and Diagrams Section of the MIM.

: All objectives in this lesson topic must be accomplis
with 100 percent accuracy, unless otherwise stated.

r to beginning this lesson topic, carefully review the
t of Study Resources". Keep in mind that your learning
rvisor can be your most valuable learning resource. Alw
free to consult with him if you have problems or questi

LESSON TOPIC 5-1-1

PURPOSE AND FORMAT OF MAINTENANCE INSTRUCTION MANUALS

To learn the material in this lesson topic, you may choose according to your experience and preferences, any or all o the following written lesson topic presentations.

WRITTEN LESSON TOPIC PRESENTATIONS IN MODULE BOOKLET:

1. Lesson topic summary.
2. Programmed instruction form of lesson topic.
3. Narrative form of lesson topic.
4. Lesson topic progress check.

ADDITIONAL MATERIALS REQUIRED FOR SUCCESSFUL COMPLETION OF LESSON TOPIC:

Student Response Sheets.
Programmed instruction response sheets.

ENRICHMENT MATERIAL:

Aviation Electronics Technician 3 & 2, NAVPERS 10317-D, Ch p. 69.

All the resources listed above are available and may be us you see fit. Your learning supervisor represents a most valuable learning resource. Use him when you need help. not necessary to use all the resources to achieve the lear objectives for the lesson topic. The lesson topic progres check is your means of determining when you have achieved the objectives. The progress check may be taken at any ti and is graded by you. If you fail to achieve any objectiv the lesson topic level, you will plan and accomplish your own remediation. If you need help in remediation planning consult your learning supervisor.

e purpose of the Maintenance Instruction Manual is to provide the i
on and instructions required to perform maintenance on an aircraft
stems in the aircraft.

aid in the use of the MIM the following three parts are used to lo
ecific paragraphs, diagrams, tables, and page numbers.

a. Table of Contents.
b. List of Tables.
c. List of Illustrations.

e MIM is typically divided into five basic sections. Section I, In
ction, contains a general description of the manual, a list of tech
rectives, and all applicable publications. Section II, "Descriptio
eration", contains the following information:

a. Electrical specifications.
b. Component complement.
c. Handling and installation.
d. Operating instructions.
e. Description of aircraft or equipment.
f. Theory of operation.

ction III, "Organizational Maintenance", contains the following inf
on:

a. Equipment supplied tables.
b. Equipment required but not supplied tables.
c. Daily and preflight inspection procedures.
d. Operational checks.
e. Major test point tables.
f. Removal and reinstallation of major units.
g. Frequency alignment.

ction IV "Intermediate Maintenance," contains secondary and minor t
int tables used as a guide for performing minimum performance test,
oubleshooting, or alignment.

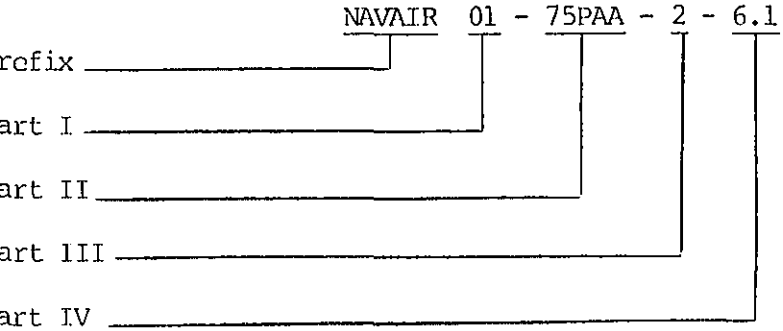
diagrams, and function block diagrams for the units covered in the

At this point, you may take the Lesson Topic Progress Check. If you answer all self-test items correctly, go on to the next Lesson Topic not, select and use another medium of instruction for the Lesson Top Programmed Instruction, Narrative, or consultation with Learning Supervisor, until you can answer all self-test items on the Progress Check correctly (achieve Lesson Topic Learning Objectives) and then proceed next Lesson Topic.

n previous units of instruction, a technical manual called a HANDBO
f SERVICE INSTRUCTIONS (HSI) was provided. The manual was divided
ine parts with a separate ILLUSTRATED PARTS BREAKDOWN (IPB). In th
nit you will be provided with a new manual called a MAINTENANCE INS
ION MANUAL (MIM). This manual covers the same information as the HS
owever, the MIM, which contains five sections, is more readily adapt
ach level of maintenance.

ublications issued by the Naval Air Systems Command are designated
ng to a numbering system based on the type publication and its mat
ontent. The system cannot be described fully in this course becaus
ts complex nature and many exceptions.

he standard designation for technical manuals consists of a prefix
lphanumeric (letter-number) sequence of three or four parts. The
xample below is used to explain the designation system for technica



STANDARD DESIGNATION FOR MANUALS

he prefix may consist of the letters NAVAIR, NAVAER (often abbrevia
AVWEPS (normally abbreviated NW), AN, TO, or CO. NAVAER manuals we
ublished by the Bureau of Aeronautice before the establishment of t
ir Systems Command. However, all manuals published since that time
esignated with the NAVAIR prefix.

art I of the coded designation shown above consists of numbers to i
he general subject classification with the basic subject to which t
ertain. These numbers usually have two digits; however, when an ad
lassification breakdown is necessary, Part I consists of two digits
ollowed by a letter. An aircraft manual is assigned the digits 01
tely following the prefix NAVAIR.

manufacturer of the aircraft or equipment. An example is NAVAIR 01-75PAA-2-6.1. 75 represents the specific manufacturer and PAA rep the aircraft model.

Part III consists of a number or numbers which designate a specific Examples of these numbers are shown below.

NA 01-75PAA -1 --- FLIGHT MANUALS (NATOPS)
NA 01-75PAA -2 ---MAINTENANCE INSTRUCTION MANUALS (MIM)
NA 01-75PAA -3 ---STRUCTURAL REPAIR
NA 01-75PAA -4 ---ILLUSTRATED PARTS BREAKDOWN (IPB)

Part IV pertains only to certain specific classes of manuals (such a MIM for an aircraft), and designates a particular manual of a set. example; Part IV of the standard designator for an aircraft MIM indi the subject content of the manual. This designator may consist of a number, a number and decimal, or even a number with double decimals, required, to breakdown the information sufficiently. Due to the dif ces in operational usage of various models of aircraft, this system be standardized completely. However, the following partial listing typical for aircraft:

-2--Airframs Maintenance Instructions Manual.
-0--Maintenance Planning Data (For some models of aircraft, this dat contained in a -100 publication rather than in -2-0.)
-1.1--General Information and Servicing.
-1.2--Corrosion Control and Decontamination.
-2--Airframe Systems
-3--Powerplant and Related Systems.
-4--Instrument Systems.
-5--Electrical Systems.
-5.1--Electrical Power Supply System.
-5.2--Lighting System.
-6--Electronic Systems.
-7--Armament and Related Systems.
-8--Airborne Missile Control Systems.
-9--Systems Integration.
-10--Wiring Diagrams.
-10.1--Wiring Data Diagrams.
-10.2--Wiring Data Repair.

Each category may be broken down into single or double decimal subdi as the occasion requires.

ne MIM contains information concerning location, function, opera-
oval, installation, testing, adjustments, and troubleshooting an
or the installed system components.

me of a MIM contains a Table of Contents, a List of Illustrations,
Tables and five (5) sections. The Table of Contents in the
ce Instruction Manual, Navy Model 15A21, contains a listing of the
sub-heading titles, paragraph and page numbers as an aid in lo-
e narrative information about the radar system. The proper use
ble of Contents will allow a technician to locate rapidly the
nformation required to perform maintenance or operation of the
rrectly.

of Illustrations and the List of Tables are for rapid location
gure or table contained within the MIM. The List of Illustrations,
of figure numbers, page, and title numbers for each figure. A
y table number, title, and page number is contained in the List
.

e of the Table of Contents, List of Illustrations or List of Tables
l in locating a description, an illustration or data in a table
ecific item.

a description of a unit and the appropriate illustration of the
Table of Contents and the List of Illustrations provide the
, _____ and _____ numbers.

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page

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in the Table of Contents is a listing of the five major sections:
INTRODUCTION
I DESCRIPTION AND OPERATION
II ORGANIZATIONAL MAINTENANCE
V INTERMEDIATE MAINTENANCE
CHARTS AND DIAGRAMS

, "Introduction", contains all of the general information of the
on in hand. This will typically include a general description of
l, the scope of coverage, arrangement of information, a listing of
cable technical directives and a list of applicable publications
ludes the manuals for the Test Equipment used on the system
by the MIM. This section is frequently overlooked by technicians,
mportance should not be taken lightly since the information pro-
e is essentially the "doorway" to what follows. With it, you will
o maintain your system and, if necessary, find the publications
to maintain your support equipment.

iption of the aircraft, system, or equipment. This description cont
mponent complement, listing equipment components; fuses, tubes, and
ansistors, electrical specifications; input and output minimum perfor
andards and the handling and installation instructions. Section II a
ntains the theory of operation and the circuit functions of the vario
jor units in the radar system explained through the aid of block diag
d simplified schematic diagrams. The operating instructions describe
rious controls and indicator functions; it also provides an explanat
the various symbols, terms, and basic circuits used in the radar sys

ction III, "Organizational Maintenance," of the MIM contains Equipmen
pplied tables, Equipment Required but not Supplied, Daily and Prefli
spections procedures, operational checks, Major Test Points tables,
moval/Replacement of major units, frequency alignments and the preven
intenance required by the organizational level technician to maintain
dar system. The equipment supplied and equipment required but not su
e listed in tables 3-1, 3-2, and these tables list the total compleme
the system and the required test equipment or tools recommended to m
in the system properly.

e daily and preflight inspections tables 3-3a thru 3-4, consist of th
spections, initial control setting and operational checks, and aided
erating instructions are used in performing system checks. The list
jor test points with the normal indications and the Functional Checks
ble are aids to an organizational technician in troubleshooting a mal
nction. Other areas in section IV include the major unit removal/rep
nt procedures and the alignments performed by the organizational tech

ction IV, "Intermediate Maintenance", provides more in-depth informat
the technician that performs component repair. Included in section
data on performing checks, tests, alignments, troubleshooting and
sassembly/reassembly of the major units to facilitate repairs. As an
performing the tests, checks, alignments and troubleshooting, a list
the secondary and minor test points with normal indications is inclu
it troubleshooting tables describe the most common or the most diffic
lfunctions that occur within the radar system.

ction V, "Charts and Diagrams", contains the complete set of wiring an
hematic diagrams for the units covered by the manual. In addition to
ese diagrams, there are functional and expanded detailed block diagra
owing the relationship between equipment, major signal paths, major
l secondary test points.

Contains system troubleshooting charts.

Contains wiring diagrams.

Contains theory of operation.

Contains a listing of applicable technical directives.

Contains a listing of performance tests and alignments.

Contains equipment and component complement.

Contains operational checks and test equipment connections.

(1) Section I, Introduction.

(2) Section II, Description and Operation.

(3) Section III, Organizational Maintenance.

(4) Section IV, Intermediate Maintenance.

(5) Section V, Charts and Diagra

, b.(5), c.(2), d.(1), e.(4), f.(2), g.(3)

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his point, you may take the Lesson Topic Progress Check. If you an self-test items correctly, go on to the next Lesson Topic. If not, ct and use another medium of instruction for the Lesson Topic: Prog ruction, Summary, or consultation with Learning Supervisor, until y answer all self-test items on the Progress Check correctly (achieve on Topic Learning Objectives) and then proceed to the next Lesson T

PROGRAMMED INSTRUCTION

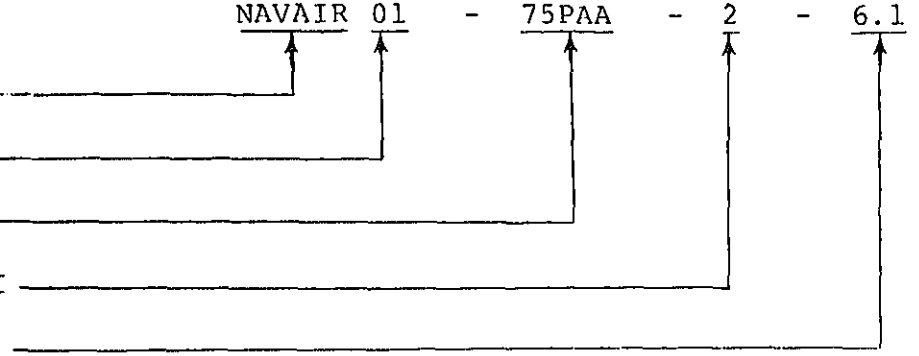
PURPOSE AND FORMAT OF MAINTENANCE INSTRUCTION MANU

INTRODUCTION

In previous units of instruction, a technical manual ca
a HANDBOOK of SERVICE INSTRUCTIONS (HSI) has been prov
The manual was divided into nine parts with a separate
ILLUSTRATED PARTS BREAKDOWN (IPB). In this unit you w
provided with a new manual called a MAINTENANCE INSTRU
MANUAL (MIM). This manual covers the same information
HSI; however, the MIM, which contains five sections, i
readily adapted to each level of maintenance.

Publications issued by the Naval Air Systems Command a
designated according to a numbering system based on th
publication and its material content. The system cann
described fully in this course because of its complex
and many exceptions.

The standard designation for technical manuals consist
a prefix and an alphanumeric sequence of three or four
The example shown on the following page will be used t
explain the system for designation of technical manual



STANDARD DESIGNATION FOR MANUALS

fix may consist of the letters NAVAIR, NAVAER (often ated NA), NavWeps (normally abbreviated NW), AN, CO. NAVAER manuals were published by the Bureau of tics before the establishment of the Naval Air Command. However, all manuals published since that re designated with the NAVAIR prefix.

of the coded designation shown above consists of numbers to the general subject classification with the basic to which they pertain. These numbers usually have ts; however, when an additional classification break- necessary, Part I consists of two digits followed by r. An aircraft manual is assigned the digits 01 tely following the prefix NAVAIR.

Part II of the standard designator consists of numbers
numbers and letters) and indicates the specific class,
type, or module and manufacturer of the aircraft or eq
ment. An example is NAVAIR 01-75PAA-2-6.1. 75 repres
the specific manufacturer and PAA represents the aircra
model.

Part III consists of a number or numbers which designa
specific manual. Examples of these numbers are shown

NA 01-75PAA -1 ---FLIGHT MANUALS (NATOPS)
NA 01-75PAA -2 ---MAINTENANCE INSTRUCTION MANUALS (MIM
NA 01-75PAA -3 ---STRUCTURAL REPAIR
NA 01-75PAA -4 ---ILLUSTRATED PARTS BREAKDOWN (IPB)

Part IV pertains only to certain specific classes of m
(such as the MIM for an aircraft), and designates a pa
lar manual of a set. For example, Part IV of the stan
designator for an aircraft MIM indicates the subject
content of the manual. This designator may consist of
a single number, a number and decimal, or even a numbe
double decimals, as required, to breakdown the informa
sufficiently. Due to the differences in operational u
of various models of aircraft, this system cannot be s
dardized completely. However, the following partial l
is typical for aircraft:
-2--Airframe Maintenance Instructions Manual.

aintenance Planning Data (For some models of aircraft, his data is contained in a -100 publication rather than n -2-0.)

-General Information and Servicing.

-Corrosion Control and Decontamination.

irframe Systems.

owerplant and Related Systems.

nstrument Systems.

lectrical Systems.

-Electrical Power Supply System.

-Lighting System.

lectronic Systems.

rmament and Related Systems.

irborne Missile Control Systems.

ystems Integration.

Wiring Diagrams.

--Wiring Data Diagrams.

--Wiring Data Repair.

category may be broken down into single or double

al subdivisions as the occasion requires.

1. The purpose of a Maintenance Instruction Manual (MIM) is to provide information and instructions required to perform maintenanc on an aircraft and systems in the aircraft. The aircraft, with all systems installed, is designated an aircraft weapons system. The MIM contains information concerning location, function, operation, removal, installation, testing, adjustments, and troubleshooting. The maintenance methods recommended are those that can be performed by an operating squadron.

   The purpose of the MIM is to provide the _____ and _____ required to perform maintenance on an aircraft.

ion

2. The purpose of a maintenance instruction manual is to

   a. provide information and illustrations on part number listings and pictorial views of aircraft components.

   b. provide instructions and information for the pilot and air crew concerning aircraft operating procedures.

   c. provide information and instructions required to perform maintenance on an aircraft and systems installed in the aircraft.

   d. provide technical information on documentation procedures utilized in aircraft maintenance.

3. A typical volume of the MIM contains a table of contents, a list of illustrations, a list of tables, and five (5) sections. (Refer to the training Maintenance Instruction Manual throughout this program.)

   The table of contents is used to locate the narrative information provided in the MIM. The left column identifies the section number using Roman numerals and the section title is located just to the right of the section number.

3. (Continued)

The narrative in each section is constr
of paragraphs. The major paragraph is
identified in the table of contents by
paragraph number and title.

The List of Illustrations consists of
a list of the figure numbers, the title
and page number of each figure. The Li
of Tables includes the table number,
title, and page number of each table.
Table of Contents, the List of Illustra
and the List of Tables, pages are numbe
in lower case Roman numerals in sequenc
(i, ii, iii, iv, etc.)

To locate a description of a unit and t
appropriate illustration of a unit, the
Table of Contents and the List of Illus
tions provides the paragraph, _____ a
_____ numbers.

4. Select three parts of a MIM used to locate specific paragraphs, diagrams, and tables.

   a. List of part numbers.

   b. Table of Contents.

   c. List of Tables.

   d. List of Illustrations.

5. The MIM provides _____ and _____ required to perform maintenance on an aircraft and systems in the aircraft.

tion

tions

6. Included in the Table of Contents is a listing of the five major sections:

   Section I - INTRODUCTION.

   Section II - DESCRIPTION AND OPERATION.

   Section III - ORGANIZATIONAL MAINTENANCE.

   Section IV - INTERMEDIATE MAINTENANCE.

   Section V - CHARTS AND DIAGRAMS.

   The format of your training MIM is similar to MIMs found in operating activities.

Section I, "Introduction," contains a
the general information that is inclu
the publication: a general descripti
the manual, including the scope of
coverage and the organization and arr
ment of the information, a listing of
applicable publications, and a list o
technical directives that pertain to
specified equipment covered by the ma

The _____ section contains a gene
description of the manual, a list of
technical directives, and all applica
publications.

ODUCTION

7. What information is contained in the introduction section of the MIM?

   a. A general description of the manual, a list of electrical specifications, and all applicable publications.

   b. A list of equipment supplied, handling and installation information and operating instructions.

   c. A general description of the manual, a list of technical directives, and al applicable publications.

   d. A general description of the manual, a list of technical directives, and a troubleshooting chart.

---

8. In a MIM, a list of descriptive paragraphs is found in the _____ of _____, a listing of the figure numbers within the MIM is found in the _____ of _____, and a listing of tables is found in the _____ of _____

Table of Contents

List of Illustrations

List of Tables

9. The purpose of the MIM is to:

a. provide information and instructior aircraft support equipment repairs.

b. provide technical information on documentation procedures utilized in aircraft maintenance.

c. provide information and instructior the pilot and air crew concerning a craft operating procedures.

d. provide information and instructior required to perform maintenance on aircraft.

---

d.

10. SECTION II, the "Description and Operat provides a physical description of the aircraft equipment with handling and installation instructions. Tables are provided listing the equipment's compor complement, such as fuses, tubes, and transistors.

A table of electrial specifications pro the input and output minimum performanc requirements. The operating instructio explain the functions of the controls a indicators. The theory of operation ex plains the circuit functions with the a of illustrations, simplified schematic diagrams and block diagrams.

10. (Continued)

In some maintenance instruction manuals, a definition and explanation of terms is provided for quick reference.

Section II, "_____ and _____," contains a physical description, component complements, handling, installation, electrical specifications, operating instructions, and theory of operation which includes block diagram and circuit analysis.

tion

on

11. What information is contained in Section II of the MIM?

a. Electrical specifications.

b. Parts list.

c. Component complement.

d. Handling and installation.

e. Daily inspections.

f. Operating instructions.

g. Performance test instruction.

h. Description of aircraft or equipment.

i. Theory of operation.

12. A general description of the manual, a list of technical directives, and all applicable publications are contained in the _____.

oduc-

13. Which of the following can be used to loca specific paragraphs, figures, and illustra tions in a MIM?

a. Glossary of Terms.

b. Table of Contents.

c. List of Illustrations.

d. List of Tables.

14. Section III, "Organizational Maintenance," contains the necessary information that is used by technicians that perform organizational maintenance on the aircraft or systems installed in the aircraft.

The "Equipment Supplied" table lists the total complement of the system. An exampl of an equipment supplied table is table 3- in the MIM.

The "Equipment Required But Not Supplied Table," provides a listing of test equipment and tools that are necessary

14. (Continued)

to perform organizational maintenance on the radar system.

Daily and preflight inspection procedures are also provided in section III. These inspection procedures utilize the visual inspection, initial control settings and the operational checks tables.

A technician who is unfamiliar with the controls and indications can use the Operating Instructions in section II in performing the operational check provided in table 3-5 of the MIM.

Major test points are listed in table 3-6 with the normal indications provided in table 3-8.

The "Functions Checks" table is a trouble shooting aid which can be used to aid an organizational technician in locating the cause of listed malfunctions.

Other areas covered in section III include major unit removal, replacement, frequency alignments, and preventive maintenance.

14. (Continued)

Section III of a MIM contains Equipme

_____ tables, Equipment _____

but not_____ tables, Daily and ___

inspection procedures, _____

checks, and _____ test point

tables, Removal and/_____

of major _____ and _____

alignment.

Supplied
Required
Supplied
Preflight
Operational
Major
Reinstalla-
tion
units
frequency

15. Which of the following information is contained in section III of the MIM.

a. Functional Checks and major unit removal/replacement.

b. Component part location.

c. Daily and Preflight inspection.

d. Theory of operation.

e. Frequency alignments and Operatic Checks procedures.

16. Section II, "Description and Operation," contains a physical description of the aircraft/system, listings of components, electrical characteristics, performance requirements, and operating instructions, also a discussion of the theory of operation, various terms, and the simplified schematics and block diagrams.

TRUE/FALSE. (Circle one).

17. The Introduction Section of a MIM contains

a. a general description of the manual, a list of technical directives, and a troubleshooting chart.

b. a general description of the manual, a list of electrical specifications, and all applicable publications.

c. a list of equipment supplied, handling and installation information, and operating instructions.

d. a general description of the manual, a list of technical directives, and all applicable publications.

Section IV, "Intermediate Maintenance" provides the necessary data for performing checks, tests, alignments, and disassembly/reassembly of the major units that make up a system.

Secondary and minor test point tables are included as a guide for performi minimum performance tests, trouble-shooting, or alignment.

Section IV of the MIM includes _____ and _____ test point tables to be used for minimum performance tests, _____ or _____.

or

uble-
oting
gnment

performance testing, alignment procedures, and secondary and minor test points are included in section:

a. II.

b. IV.

c. III.

d. V.

20. Which two items below are <u>not</u> found in section III of the MIM?

a. Removal and replacement procedures.

b. Operational checks.

c. Daily and Preflight Inspections.

d. Equipment supplied lists.

e. Equipment required but not supplied.

f. Functional checks.

g. Theory of operation.

h. Tube and transistor complements.

g, h.	21. Which of the following is information c tained in the Description and Operation Section of the MIM? a. Daily inspection and performance te procedure. b. Component complement and electrical specifications. c. Handling and installation and descr tion of major assemblies. d. Operating instructions and theory c operation.
b, c, d.	22. Section V, "Charts and Diagrams," conta a complete set of wiring and schemati diagrams for the units covered in the manual. Included is a functional block diagram that presents an overall functi view of the relationships between circu blocks and the major signal paths to an from the blocks. Wiring diagrams, schematic diagrams, an functional block diagrams are found in section _____.

23. Which three items are included in section V of the MIM?

a. Simplified block diagrams.

b. Functional block diagrams.

c. Component part locations.

d. System wiring diagrams.

e. Schematic diagrams.

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24. The Intermediate Maintenance Section of a MIM contains disassembly/_____ procedures, _____ and _____ test point tables, _____ and alignment procedures.

---

25. Which of the following describes information <u>not</u> contained in the Organizational Maintenance Section of a MIM?

a. Equipment supplied and major unit removal/replacement.

b. Operational checks.

c. Theory of operation.

d. Daily inspection and Preflight inspection.

P.I.	
c.	26. List the three items found in the Ch and Diagrams section of the MIM. a. _____. b. _____. c. _____.
a. Functional block diagram. b. Schematic diagrams. c. System wiring diagrams.	27. The Intermediate Maintenance Section the MIM contains a. circuit board repair instruction electrical specifications. b. secondary and minor test point t procedures for performance tests alignment and disassembly/reasse of the major units. c. operating instructions and daily inspection procedure. d. performance test procedure and a diagram analysis.
b.	28. Select the items which are contained Charts and Diagrams Section of a MIM a. Simplified block diagram. b. Overall functional block diagram c. Complete schematic diagrams. d. System wiring diagrams.

At this point, you may take the lesson topic progress check. You may find it beneficial to review the objectives for this lesson topic. If you answer all self-test items correctly, go on to the next lesson topic. If not, select and use another medium of instruction, narrative, or consultation with the learning supervisor, until you can answer all self-test items on the progress check correctly (achieve lesson topic learning objectives) and then proceed to the next lesson topic.

AVIONICS TECHNICIAN COURSE, CLASS A1

UNIT 5

MODULE 1

LESSON TOPIC 2

TING INFORMATION FROM MAINTENANCE INSTRUCTION MANUALS

LESSON TOPIC 5-1-2

TING INFORMATION FROM MAINTENANCE INSTRUCTION MANUALS

lesson topic you will extract information from each of the MIM. The purpose of this lesson topic is to guidance for the proper use of the MIM in obtaining essary information to meet organizational and inter- maintenance requirements comparable to those maintenance ments performed by avionics technicians in operating es.

rning objectives for this lesson topic are as follows:

en the MIM of the 15A21 radar trainer, and an illustra- of the radar trainer, label each major unit.

en the Electrical Specifications Table in the 15A21 ner MIM and an incomplete table, list the LIMIT or Des- tion for each listed Characteristic.

en a table, fill in each blank with the appropriate data ained from the Interconnections and Test Cable Connec- ns table located in the radar trainer MIM.

ect from a list the necessary control settings required obtain given functions/indications.

en the MIM of the 15A21 radar trainer, list the two or subdivisions of the Preflight Inspection table.

en a list of checks, select the checks that make up the rational Checks Table for the airborne search radar ner.

en the discrepancy that the antenna will not rotate with N mode selected; select the major test point(s) that are ed on the Functional Checks Table for this discrepancy.

en a list of major test point symbols, list the reference gnator and signal nomenclature for each symbol.

en a list of major test points, list the required signal tage characteristics for each test point.

waveform for each test point.

11. Given a list of minor test points and a MIM for the trainer, list the location reference designator and clature of each minor test point.

12. Given a list of signal nomenclatures, list the requi signal characteristic as specified in the Performanc Tests and Alignment procedures in the MIM.

13. Given the Unit Troubleshooting Tables in the MIM and specific trouble, list the Probable cause and Correc Action as specified in the MIM.

14. Given the Functional Block Diagram in the MIM for th radar trainer, complete a statement that describes t signal/voltage for each specified test point.

15. Given the Power Distribution Diagram in the MIM for radar trainer, and a specific voltage to or from a s cific major unit, select the applicable cable refere designator.

16. Select from a list, the part number and description specified components as they are listed in the Group Assembly Parts List Section of the IPB for the radar trainer.

17. Given a part number, select from a list the componen cription and location using the IPB for the radar tr

18. Given a reference designator and the IPB for the rad trainer, select from a list the correct part number component description.

NOTE: All objectives in this lesson topic must be accomp with 100 percent accuracy, unless otherwise stated

Prior to beginning this lesson topic, carefully review th of Study Resources". Keep in mind that your learning sup can be your most valuable learning resource. Always feel to consult with him if you have problems or questions.

NG INFORMATION FROM MAINTENANCE INSTRUCTION MANUALS

the material in this lesson topic, you may choose,
to your experience and preferences, any or all of the
written lesson topic presentations.

ESSON TOPIC PRESENTATIONS IN MODULE BOOKLET:

n topic summary.
ammed instruction form of lesson topic.
tive form of lesson topic.
n topic progress check.

L MATERIALS REQUIRED FOR SUCCESSFUL COMPLETION OF
PIC:

enance Instruction Manual, Airborne Search Radar
er 15A21, Illustrated Parts Breakdown, Airborne Search
Trainer, 15A21.

nt Response Sheets.
ob data sheets.
nswer sheet for use with test.
rogrammed instruction response sheets.

T MATERIALS (topic reference):

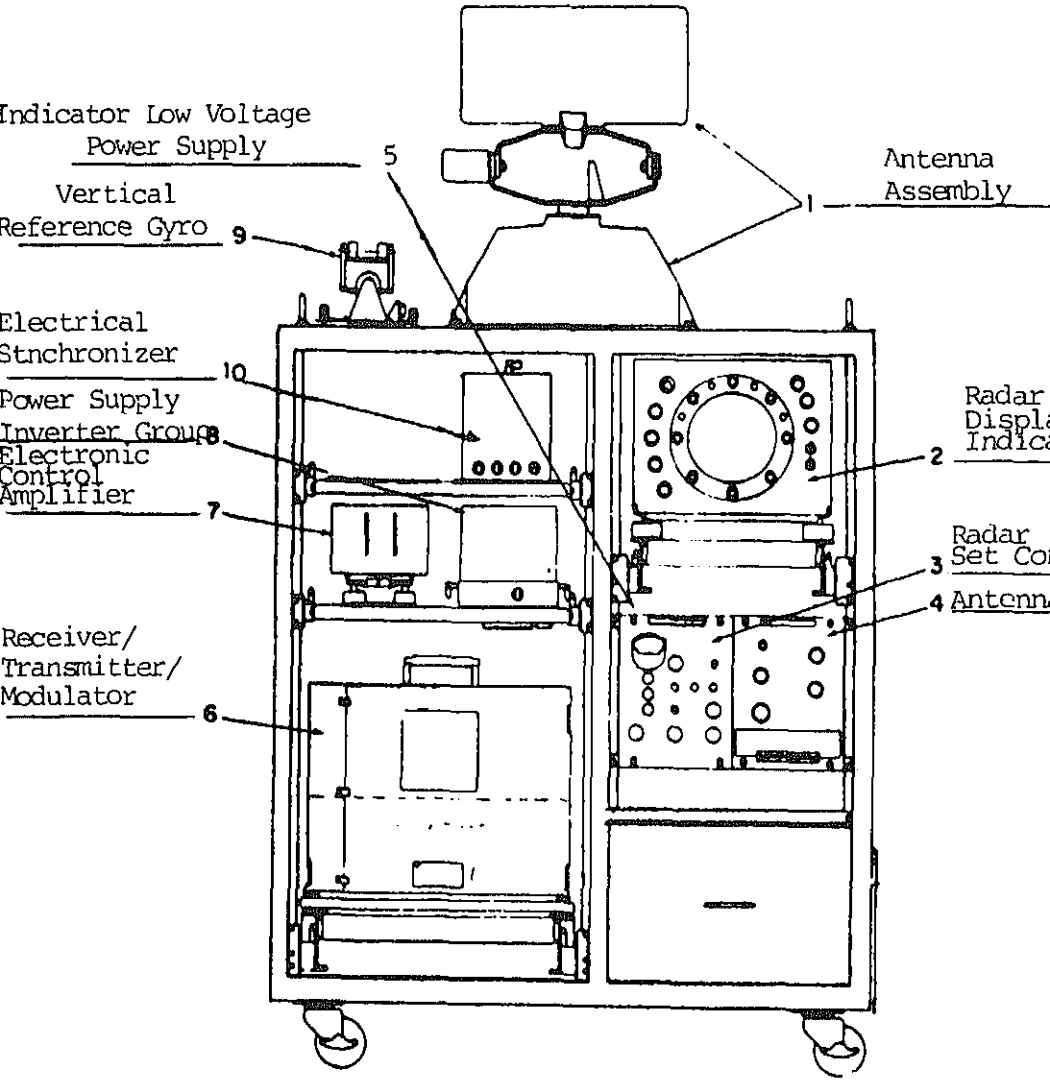
Electronics Technician 3 & 2, NAVPERS 10317-D, CH. 4.

esources listed above are available and may be used as
it. Your learning supervisor represents a most valuable
resource. Use him when you need help. It is not
to use all the resources to achieve the learning objec-
the lesson topic. The lesson topic progress check is
s of determining when you have achieved the objectives.
ess check may be taken at any time and is graded by
you fail to achieve any objective at the lesson topic
u will plan and accomplish your own remediation. If
help in remediation planning, consult your learning
r.

LESSON TOPIC SUMMARY

EXTRACTING INFORMATION FROM MAINTENANCE INSTRUCTION MANUALS

The 15A21 radar trainer consists of 10 major units. These units are shown and labeled below.



The Electrical Specifications, table 2-4 in the MIM, consists of the characteristic and the Limit or Description columns. A description o limitation is specified for each characteristic. To insure that all cables between the major units are connected properly, the technician should refer to the Interconnection and Test Cables Table 2-5. This table gives the cable part number and lists the reference designator for each connector to which the cable is attached. Figure 2- depicts the physical routing of the interconnection cables

and the Simulated Vertical Reference Gyro respectively. The
function of the controls are described in table 2-6.

spections are performed on all systems installed in an aircraft
security and operational readiness. Table 3-3a provides a
rforming a visual inspection of the search radar trainer. The
rol Setting (Table 3-3b) lists the individual control setting
lished prior to turn-on of the radar. Table 3-5, the Opera-
s Table, is designed to aid the technician in determining the
readiness of the radar. It consists of three columns: The
lumn describes the individual checks to be performed; The
lumn provides a reference to paragraphs, tables or figures that
technician in performing each specific check; The Corrective
n specifies the corrective action or reference to the Func-
.

al Checks (Table 3-7) is a guide designed to aid the techni-
ating malfunctions in the airborne search radar trainer. The
lists common faults. The Probable cause column lists the
cause of each problem. The applicable major test point(s)
d is provided for each fault. The Corrective Action column
e repair or replacement that will correct each specific

the MIM provides a listing of the major test points. The
olumn lists each major test point in numerical sequence. A
signator for each major test point is given in the Location
signal/voltage for each major test point is listed in the
column.

jor test points are used to isolate malfunctions to a major
mbly. Table 3-8, Functional Check-Major Test Point Waveforms,
ation concerning major test points. This table has three
or Test Points, Location Reference Designator, and Waveform/
ation. The Secondary Test Points and Indications Table 4-1,
ary test point number and reference designator. The right
lists the nomenclature of the signal and specifies or illus-
ormal indication for each test point.

inor Test Points, lists the reference designator, signal/
nclature and normal indication for each minor test point.

nce Test and Alignments procedures provided in section IV of
ifies the minimum checks and tests that are necessary to main-
rformance of the radar, as well as procedures for aligning the

ouble shooting table, 4-4 through 4-13 consists of three columns,
bable cause and corrective action.

the major units and gives the nomenclature of the signals. The Powe
Distribution Diagram, figure 5-2 in the MIM, lists the cable referen
designators, the pin connectors for the cables, and the signal/volta
or other applicable information for each cable.

The IPB is divided into four sections. Section I contains informati
on how to use the IPB. Section II, the Group Assembly Parts List,
contains illustrations of the individual units and cards/subassembli
showing component location with an index number for each component.
Following each figure is a five-column table listing the following:

1. Figure and index numbers,
2. Part number,
3. Description,
4. Units per assembly, and
5. Usable on code (Not used in the IPB for the search radar trainer

The Numerical Index, in section III of the IPB, lists part numbers a
cross references the part numbers to Figure and Index numbers. The
Reference Designation Index, section IV in the IPB, provides a listi
the reference designators in alphanumerical sequence with the applic
part number and figure and index number listed for each reference
designator.

At this point, you may take the Lesson Topic Progress Check. If you
answer all self-test items correctly, go on to the next Lesson Topic
not, select and use another medium of instruction for the Lesson Top
Prigrammed Instruction, Narrative, or consultation with the Learning
Supervisor, until you can answer all self-test items on the Progress
correctly (achieve Lesson Topic Learning Objectives) and then procee
the next Lesson Topic.

RACTING INFORMATION FROM MAINTENANCE INSTRUCTION MANUALS

ians that perform maintenance on avionics systems at the nal or intermediate level must be proficient in the extraction information from the MIM of the aircraft/system. He must le of Contents, the List of Illustrations and the List of ted in the front of the MIM to determine the page/paragraph ssary to locate specific information.

steps in performing maintenance on systems installed in an the locating of the major units/assemblies. The MIM provides of the aircraft by systems. Technicians use the part of a scribes and illustrates the locations of installed system Section III of the MIM provides figures and tables that can determine the location, nomenclature and reference designators r units that make up the Airborne Search Radar Trainer. Figures in the MIM depict the front and rear views of the radar igure 2-3 depicts the routing of the interconnecting cables. through 2-13 depict the ten major units individually. A descrip- n major assembly (unit) is provided in paragraphs 2-19 through MIM. Figure 2-3A shows the location of Major Units.

n should become thoroughly familiar with the capabilities and of the system prior to performing any operational checks or electrical specification table (table 2-4) is provided in the ives a description/limitation of the operating characteristics r system. Table 2-6 & Figure 2-15 describes the control settings.

eristics are listed under the following headings: General, Receiver, Indicator/Synchronizer, and Antenna.

e Electrical Specifications Table in the MIM. List the PX and TX peak power. _____ and _____

300-1000 Watts

---

t factor is that a technician must know the proper inter- of the cables between the major units/assemblies. Illustra- ables are provided that describe the routing and proper connec- cables. Table 2-3 depicts the routing of the cables between or units of the radar trainer. Each jack is identified by a esignator. Table 2-5 in the MIM lists the reference desig- W2, W3 etc.) for each interconnecting cable. A part number for

ck reference designators are listed for each interconnecting cable.

ble W7 is connected between _____ and _____;
ble # _____ is connected between jacks A8J1 and PS1J4.

J1; A4J1; W19

---

ere are numerous types and models of avionics systems that a technic
st operate during operational checks, or while making specific check
isolate a cause of a malfunction. Prior to operating any avionics
e technician must at least have a basic knowledge of how the system
ntrolled. To achieve the basic knowledge of the functions performed
erating controls and indicators, a technician should refer to the op
ng instructions, paragraphs 2-54 through 2-57 in the MIM. Figures 2
rough 2-13 depict the major units that have operating controls.

e name (nomenclature) and the reference designator is given for each
ntrol and indicator.

ble 2-6 may be used with figures 2-14 through 2-18 to associate each
ntrol or indicator with its purpose or functional indication. Table
s arranged in the following sequence: Antenna control unit, Display-
cator, Radar Set Control, Synchronizer and the Simulated Vertical Re
ce Gyro Unit.

efer to table 2-6 and figure 2-16 in the MIM. Which light will be il
nated when the OFF-STBY-ON switch is in the ON position? _____

---

n Light

---

ction III of a MIM consists of information that is used primarily by
echnicians in aircraft squadrons. One of the most common jobs perfor
echnicians in a squadron is performing a preflight check on the avion
ystems installed in each aircraft. The procedures for performing pre
ecks are normally specified for each system. Paragraphs 3-8 through
the MIM for the airborne search radar trainer describe the steps i
erforming a preflight inspection including the visual checks, initial
ntrol setting, and the operational checks.

ich is sub-divided into two parts. The visual inspection
will verify the material condition of the systems installation.
control setting (table 3-3b) should be performed prior to the
of the operational check. This is very important because if
controls are improperly set, damage to the equipment or injury
working in or around the aircraft or equipment could occur.

s 3-3a and 3-3b. List the titles for each below.

_____
_____

---

l Inspection Procedures
al Control Settings.

---

sual inspection and initial control settings have been performed,
ajor part of the preflight is to perform the operational check
paragraphs 3-26 through 3-29 in the MIM. The operational check
is also performed during other inspections to verify malfunctions
ensure the system functions properly after repair has been per-
e system. Table 3-5 consists of three columns titled Procedure,
nd Corrective Action. It follows a step-by-step check of all
system.

ajor steps that are listed in the operational checks table.
checks.
mode checks.
checks.
t checks.
e checks.
cks.
checks.
y checks.
Stabilization checks.
ter checks.
ecks.

---

g, h, i, j

---

rpose of an operational check is to determine the operational
a system, any operational malfunction should be checked out
the cause of the malfunction.

e and Corrective Action columns of the operational check (table
es the appropriate step to use in the functional checks table

quent or most difficult malfunctions. To determine the cause of
function, the technician will perform further checks at designat
st points.

st faults listed in table 3-7 have one or more possible causes lis
e probable cause column. No attempt has been made to list all pos
functions. One or more major test points are listed for each pro
use. A technician should check as many test points as needed to
e defective major unit.

fer to step 2 of the Functional Checks, Table 3-7,and list the ma
ints that should be checked for a probable cause of : No sweep s

---

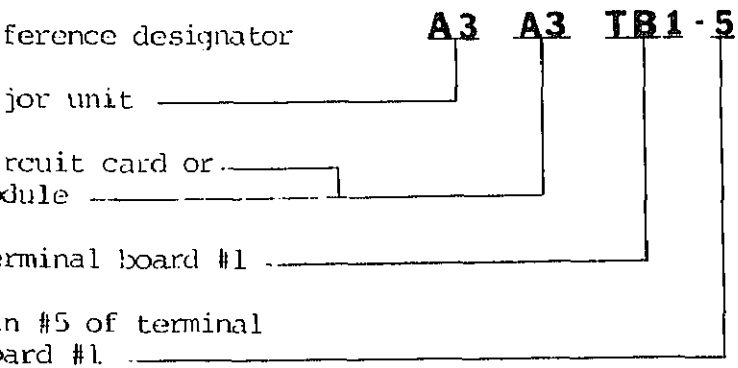
110, 111, 112, 18, 20

---

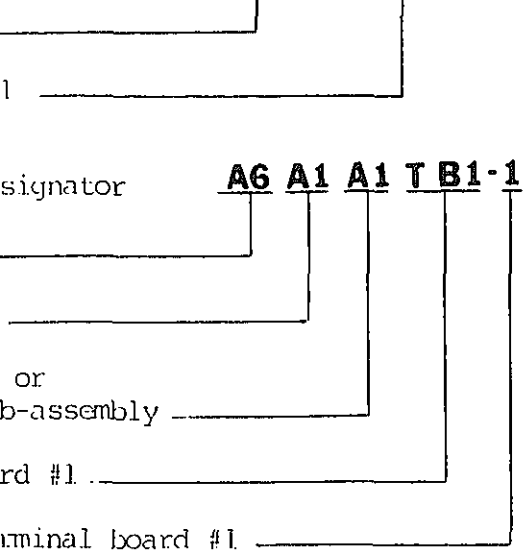
l major test points are listed in table 3-6. The left column lis
st points in numerical sequence. A reference designator is liste
ocation" column for each major test point which is used with the
e figure (figure 3-4 through 3-13) to determine the physical loca
ch test point. Major test points are used to isolate malfunction
jor unit.

e complexity of a reference designator is determined by its physi
on. A reference designator for a test point located on a circuit
uld have more designators than a reference designator for a test
ternally located on a major unit.

e following is a breakdown of an example reference designator to
at each part represents,



me test points are located externally of the major unit and use t
ese test jacks are identified in a similar manner.



g designators are commonly used in reference designators.

t point
minal board
cuit card or subunit plug/jack connector
tage test point
k
tch

ion column of table 3-6 describes the normal signal, voltage, or
r each major test point. List the location and description of
oints 63 and 116.

63 _____ _____

116 _____ _____

Mag current input
-3, 2-20 mile range control input to synchronizer.

---

ck-Major Test Point Waveforms (table 3-8). This table provides the
or test points in numerical order, the reference designator location
the voltage/waveform normally observed for each test point used in
ctional check. Refer to major test point 6 on table 3-8. Majo
t point 6 is shown having three (3) distinct waveforms. This is be-
se of the different ranges selectable on the display-indicator. Fac
eform shown provides the cycle time, pulse train length, pulse spaci
imum amplitude and the reference level.

ain the specific information for the following major test points.

Maximum amplitude of noise is _____

Indication is _____

- +.2v	#7 - +12 vdc

performance of intermediate maintenance is more involved than organ
nal maintenance. Section IV of the MIM provides the necessary infor
n to maintain the radar system at this higher level of maintenance.
hnician performing organizational maintenance only had to find the
fective "black box" or major unit. Then the intermediate maintenanc
hnician must be able to troubleshoot each malfunction to the defecti
ule, stage, circuit, and component. Contained in section IV are tes
nt tables, troubleshooting tables, adjustments and alignments, and
sembly/disassembly procedures. The tables of test points include sec
ble 4-1) and minor (table 4-2) test points. Secondary test points (
table 4-1) are used to isolate the cause of malfunctions to defectiv
ules/circuit cards or networks that are a part of a major unit/assem
minor test points (refer to table 4-2) are used to isolate malfunct
hin the modules or circuit cards. You will notice that the test poi
les are designed along the same order and by mastering the use of on
other is easy.

t the reference designator and nomenclature for secondary test point

2MG1-8	AZ TACH SIGNAL

Ⓐ, Ⓑ, or Ⓐⓐ, where the minor test points use capital letters
Arabic numerals enclosed in circles, as shown in the following

Ⓐ1 Ⓐ2 Ⓐ3 etc.
Ⓑ1 Ⓑ2 Ⓑ3 etc.

table 4-2, the minor test points are sequenced consecutively
ed by major units. Simple examples of uses of minor test points
c voltage and resistance test points, output of a stage/circuit
ement of gain, signal injection and isolation checking for defects.

inor Test Point Table, list the required information below.

Ref. Design.	Indication
_____	_____
_____	_____

1-5	Resolver Sweep
B1-2	Azimuth Drive Signal

nance of the avionics radar system is very difficult. So to
s difficulty, a step-by-step procedure outlining troubleshooting,
e test, and alignments of the various major units is provided in
. Refer to the Performance Tests and Alignments portion of
. The procedures specified contain the minimum performance checks
necessary to maintain the radar at its peak performance. These
combined for each major unit as an aid in verifying defects,
and circuit alignment.

troubles in an avionics radar system cannot be corrected by the
or adjustemnts because of component failure, the defect must
and repaired or replaced as required. As an aid, section IV
he intermediate maintenance technician with a series of tables,
through 4-13, for each major unit that outlines the faults
oints necessary to isolate a defective circuit card or stage.
he synchronizer unit, A3, the range mark output at A3A3TB1-5 is
econds. Is this a normal or abnormal indication? If at A3A3TB1-1
4.48 microseconds, is this normal or abnormal?

ABNORMAL

f the range marks oscillators. However, some defects cannot be corr
y alignments or adjustments because of component failure. Section I
he MIM provides a separate troubleshooting table for each major unit
ing the test points necessary to isolate malfunctions to an applicab
ircuit, card or stage.

efer to table 4-5, trouble I, in the MIM These six (6) steps follo
equence will isolate a defective unit, card and component that will
he fault "NO Intensity Control of the Display." On this same page
ther isolation steps will only isolate to a defective circuit card.
s done when the intermediate maintenance activity includes a module
ection that performs only component repair on circuit cards.

ist the corrective action for the trouble specified below.

ynchronizer

Trouble	Probable Cause	Corrective Action
oss of 1 kHz utput	step 2a	_____
		_____
		_____

Replace the A3A1 card.

---

he Charts and Diagrams, section V of the MIM, contains the functiona
iagrams, wiring diagrams and schematic diagrams for the radar system
he functional diagram , figure 5-1 sheet 1 of 9, shows the major sig
low paths between each of the major units and the major test points
o isolate to a defective major unit/assembly. Following the functio
lock diagram (figure 5-1, sheets 2 through 9) are expanded diagrams
etailed block diagram by major units/assemblies that also depict the
ignal paths and test points, but also have the secondary signal path
heir test points added.

efer to the Functional Block Diagram (figure 5-1, sheet 1 of 9). Li
utput nomenclature and test points of the Simulated Vertical Referen
yro Unit, A2.

---

itch reference	Roll reference	# 92	#93

gure 5-2 shows the interconnecting power distribution schematic,
put/output power paths can be found by jack, plug, and wire
e) identification. This provides an easy aid in the location
or no input voltage caused by a defective wire or unit. Figure
into three (3) sheets, shows all the interconnecting wiring
tage, current paths) between units/subassemblies of the radar
s in figure 5-2, is used to locate defective plugs, jacks or

re of the interconnecting wiring diagrams, the plug, jack, and
are identified by a standard code; "W" for wires or wire
for equipment jacks, and "P" for plugs. The wires within the
onnected to either male or female pins and are identified by
er case letters.

ure 5-3 in the MIM and list the wire numbers, plug and pin
he listed signals/voltages between units.

Signal/voltage	Wire #	Plug #	Pin #
Waveguide Switch Control	_____	_____	_____
Tilt Angle	_____	_____	_____

1/P2	S
1/P2	L, M, N

---

fective major unit, module/circuit card or component part has
, it must either be repaired or replaced. To facilitate this
lustrated Parts Breakdown (IPB) is provided for the aircraft or
tem. The IPB consists of four sections. Section I is the
. Section II is the Group Assembly Parts List. Section III
ical Index and Section IV is the Reference Designator Index.
troduction contains information on scope, supplementary in-
nd how to use the IPB. Section II Group Assembly Parts Lists,
figures and tables showing the physical location of components
or units or circuit boards. As an example; suppose the antenna
damaged and needs to be replaced. To do this, the part number
ion are needed to be able to order the reflector from the supply
locate this information, first refer to the table of contents
nd determine the figure and page number for the major unit,
it card in which the component is located. The table of contents
tenna assembly in figure 1, sheets 1 and 2, on pages 2-1, 2-2
. Referring to figure 1, sheet 1 of 2, the antenna reflector
d by INDEX number 2.

nd units per assembly. Refer to pg. 2-3 in the IPB and locate 1-2
igure/index number column. The part number, listed across from it,
803-1 and the description is Reflector, Antenna, A1 (529260C90041),t
nit per assembly is 1.

ransistor Q2 on the AFC INTEGRATOR CARD is defective. List the info
or Q2 in each blank below. Refer to the IPB.

. Figure and item number _____
. Part number _____
. Description _____
. Units per assy. _____

. 24-8
. 2N4931
c. Transistor, PNP, silicon
d. one

---

he IPB also provides for situations where only a part number is know
he remainder of the information must be found. Section II of the IP
he Numerical Index, provides a cross-reference from the part number
anufacturer's code, figure and index number, National Stock Number,
ny), Quantity per trainer and course code. The part numbers are lis
lphanumerically starting with letters and then numbers. The same pa
umber may be used more than once in the equipment. If this occurs,
igure/index numbers will be listed. You may use either index number
ind the figure/index number, locate the part number, then turn to th
orresponding figure/index number in section II. For example: refer
ection III and locate part number RCR07G201JS, notice that the figur
ndex number is 5-29/18-11;now refer to section II and list the descr
elow.

ESISTOR, FIXED COMPOSITION: 200 ±5%, 1/4 WATT

---

ection IV, Reference Designator Index, is used when the reference de
ator is known. This section of the IPB is arranged alphanumerically
ng in sequence all designators of the radar system. For example, du
roubleshooting of the sweep generator card, C4 is found to be defect
he complete reference designator for C4 is A3A2C4 because it is loca
ithin the synchronizer unit, A3, and on the sweep generator card, A2
efer to the IPB section IV, locate A3A2C4 and you find the part numb
s CQ09ALMA333J3 and the figure/index number is 6-9. From this
nformation, the location and description can be located in section I

defective and must be replaced. List the required information

number _____

iption _____

e/index number _____

0C60030
it card assembly; Resolver driver

---

oint, you may take the Lesson Topic Progress Check. If you
l self-test items correctly, go on to the next Lesson Topic.
elect and use another medium of instruction for the Lesson Topic:
d Instruction, Summary, or consultation with Learning Supervisor,
can answer all self-test items on the Progress Check correctly
Lesson Topic Learning Objectives) and then proceed to the next
oic.

PROGRAMMED INSTRUCTION

EXTRACTING INFORMATION FROM MAINTENANCE INSTRUCTION MANUALS

INTRODUCTION

Technicians who perform maintenance on avionics systems the organizational or intermediate level must be proficie in the extraction of applicable information from the main ance instruction manual of the aircraft in which the avio system is installed.

This lesson topic provides a breakdown of each section of MIM for the Airborne Search Radar Trainer, Device 15A21.

Use the Table of Contents, the List of Illustrations and List of Tables located in the front of the MIM to determi the page/paragraph number as necessary to locate specific information.

	1. One of the steps in performing maintenan on a system installed in an aircraft is locating the major units/assemblies or o components. The Maintenance Instruction Manual of a airborne weapons system provides a break

1. (Continued)
down of the aircraft by systems. Avionics technicians use the part of a MIM describing and illustrating the location of avionics systems components.

The training MIM for the Airborne Search Radar Trainer, Device 15A21, provides a breakdown of the radar trainer in a similar manner as a MIM for an aircraft.

Section II of the MIM provides figures, tables and charts that can be used to determine the location, nomenclature and reference designator of the major units that make up the Airborne Search Radar Trainer.
Refer to section II of the MIM; how many major units make up the radar trainer?

_____

2. Refer to section II of the MIM for the radar trainer.

2. (Continued)

List the nomenclature for each of the
units, 1-5, as indicated in the illus
on the following page.

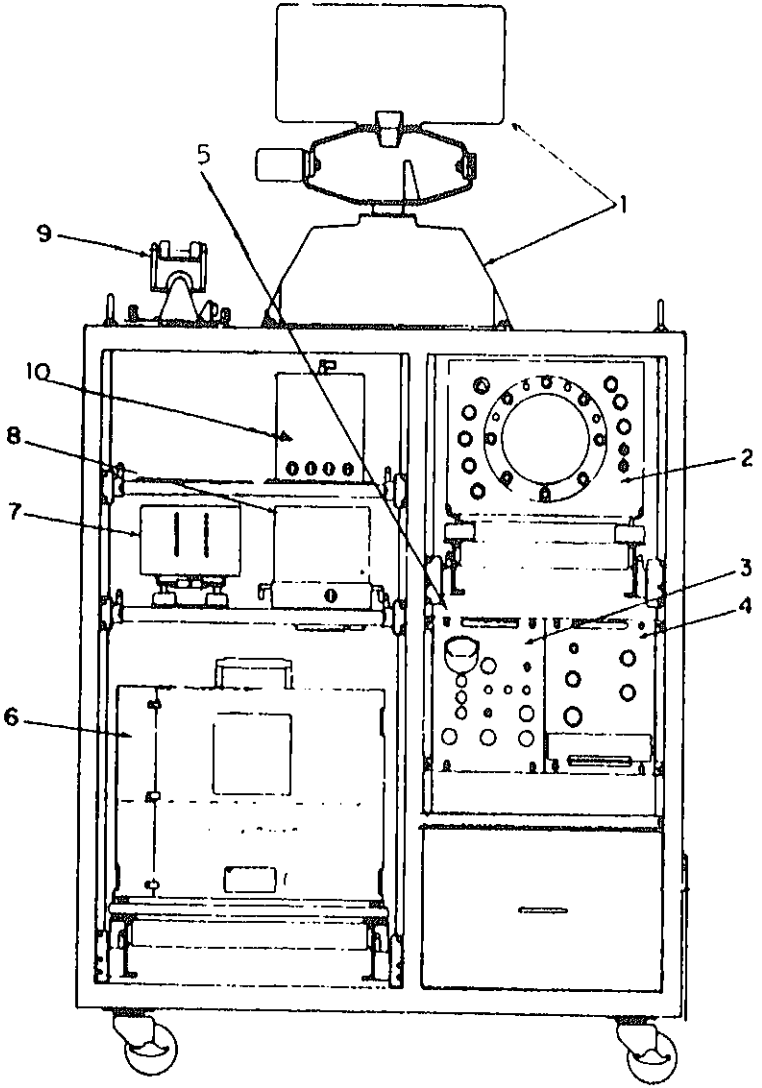
1. _____

2. _____

3. _____

4. _____

5. _____


1
2
3
4
5
6
7
8
9
10

Assembly (A1).

Radar Display-Indicator (A4).

. Radar Set Control (A7).

. Antenna Control (A8).

. Indicator Low voltage power supply (PS2).

liar with the capabilities and limitation of an avionics system prior to performing any operational checks or tests.

Electrical specification tables are provi in maintenance instruction manuals for th purpose of providing data which specifies operating requirements and characteristic

Refer to the Electrical Specifications Ta in the MIM for the radar trainer. List t RX sensitivity and TX peak power.

_____ and _____.

90 dbm

00-1000 watts

4. Refer to the Electrical Specifications Table in the MIM for the radar trainer an list the limit or description for each characteristic listed below.

Characteristic	Limit or Descript
a. Input power.	_____
b. Dummy load.	_____
c. Pulse repetition frequency.	_____
d. Gain control	_____

5. The description and operation section of a MIM provides figures that depict the major units that make up the system.

Refer to section II of the MIM. List the nomenclature for each of the major units, 6-10, as indicated in the illustration on the following page.

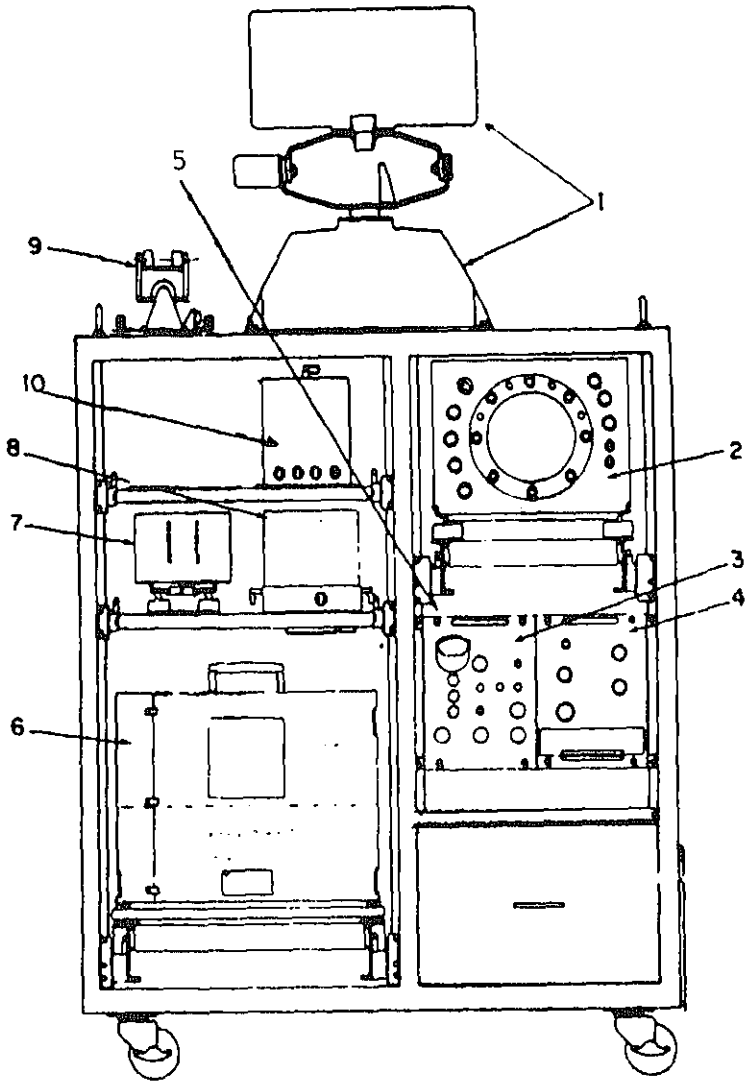
6. _____

7. _____

8. _____

9. _____

10. _____


1
2
3
4
5
6
7
8
9
10

proper interconnection of the cables between the major units/assemblies. Illustrations and tables are provided that describe the routing and proper connection of the inter-connecting cables.

Refer to the Interconnection and Test Cable Chart and the Interconnection Diagram in the MIM for the radar trainer.

Cable W7 is connected between _____ and _____; cable #_____ is connected between jacks A8J1, and PS1J1.

7. Refer to the MIM for radar trainer. Complete the information for each of the cables listed below.

Cable	Part Number	From	To
W3	_____	____	____
W8	_____	____	____
W12	_____	____	____

529260C60158
A1J3
A3J5

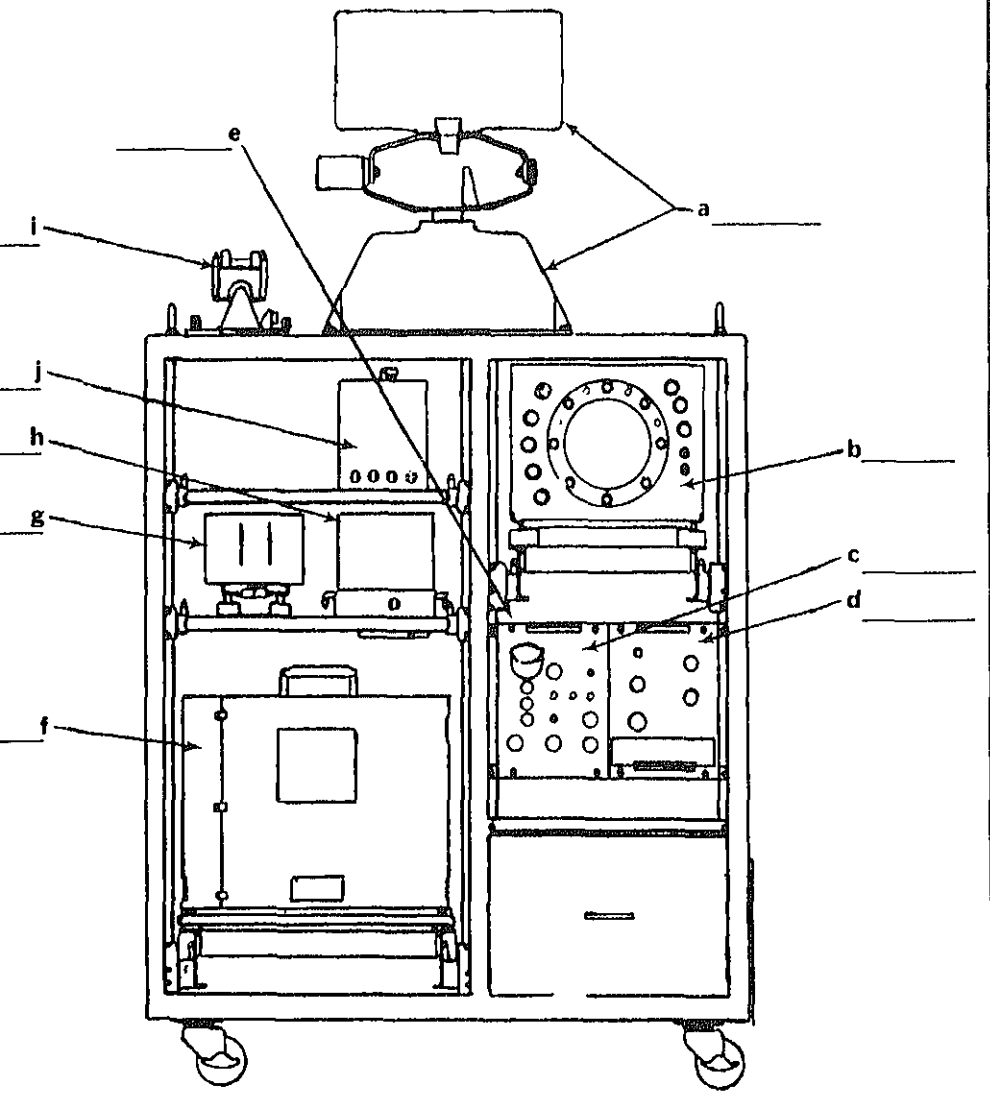
529260C60085-12
A6A1J4
A3J2

529260C60155
A5J1
PS1J2

8. A technician should learn the capabil
and limitations of an electronic syst
to operating it. The Electricial Spe
tions Table in the MIM contains this
for the radar trainer.
List the limit or description for eac
characteristic listed below.

CHARACTERISTIC	LIMIT or DES
a. rf source	_____
b. RCVR 1&2 crystal	_____
c. i-f frequency	_____
d. local oscillator	_____

9. Refer to the MIM for the Airborne Search Radar Trainer and label the major units by nomenclature and reference designator.



P.I.

a. Antenna Assembly (A1)

b. Radar Display Indicator (A4)

c. Radar Set Control (A7)

d. Antenna Control (A8)

e. Indicator Low Voltage Power Supply (PS2)

f. Receiver/ Transmitter/ Modulator (A6)

g. Electronic Control Amplifier (A5)

h. Power Supply Inverter Group (PS1)

i. Vertical Reference Gyro (A2)

j. Electrical Synchronizer (A3)

10. There are many times when a techni
must rely on the information provi
in the MIM of a system to learn th
operating procedure for the system
a technician should learn the loca
the purpose of the operating contr
There are figures provided in sect
the MIM which depict the nomenclat
location of the controls. Additio
a table or series of tables is pro
in section II, which describes the
function of each control and indic

Refer to the Table of Contents, Li
Illustrations, and List of Tables
the figures and Operating Controls
Indicators table as necessary to m
control/indicator listed on the fo
page to its purpose.

10. (Continued)

CONTROL	PURPOSE
a. Test meter (M1)	(1) Selects normal or offset range sweep on CRT.
b. OFF-STBY-ON	(2) Selects the desired range for PPI display.
c. Range Switch	(3) Energizes system and selects system function.
d. NORMAL/DEPRESSED CENTER SWITCH	(4) Monitors current flowing through strategic system elements.

11. Match each control/indicator listed below to the correct purpose.

CONTROL/INDICATOR	PURPOSE
a. Tilt control switch	(1) Controls elevation of antenna.
b. Gyro power switch	(2) Indicates system status.
c. COAC ON-OFF switch	(3) Reduces effects of clutter.
d. STBY light	(4) Supplies 26vac, 400Hz excitation to the gyro.

a1, b4, c3, d2

12. If a technician is assigned a job on
aircraft that necessitates installati
a major unit he should refer to the I
connection and Test Cable Chart to ir
all external cables are properly conn

Refer to the MIM for the radar traine
complete the following:

Cable	Part Number	From	
W6	_____	_____	_
W10	_____	_____	_
W19	_____	_____	_

13. Refer to the Electrical Specifications Table in the MIM for the Airborne Search Radar Trainer and list the limit or description in the appropriate blanks below.

CHARACTERISTIC	LIMIT OR DESCRIPTION
a. Input Power	
b. Warmup time for magnetron	
c. Transmitter frequency	
d. Average output power	
e. Pulse Repetition Frequency	
f. Duty Cycle	
g. Receiver Sensitivity	
h. Receiver i-f frequency	
i. Type of local oscillator	
j. Type of display indicator	
k. Antenna operation rate (1) scan (2) sector	

a. 3 phase, 60Hz, 115 vac

b. 5 minutes

c. 9375 MHz ADJUSTABLE 8800-9600 MHz

d. 0.3-1.0w

e. 1kHz ± 25 Hz

f. 0.001

g. -90dbm

h. 30 MHz

i. Klystron

j. PPI, DE-PRESSED CENTER FUNCTION

k. 1.6rpm ± 10%

2. Variable 40-140 ± 2° @ 3 rpm

14. A preflight inspection consists of t
essential parts , an overall check o
material condition and an operationa
The material con ition is determined
performing a visual inspection of th
installation. The inspection should
accomplished in accordance with the
Inspection P ocedures.

Prior to performing an operational c
the technician should perform the In
Control Settings of the system being
checked.

Locate tables 3-3a and 3-3b and list
titles of each part.

3-3a_____

3-3b_____

15. Refer to section III of the MIM for the 15A21 radar trainer.

List the two major sub-divisions of the Pre-flight Inspection Tables.

3-3a. _____

3-3b. _____

In-
n
res

s

16. Correct operation of a system is imperative either during flight operations or during system maintenance. Therefore the technician should become familiar with the operating controls and the indications for specific control settings.

Refer to table 2-6 and figure 2-16 in the MIM. Which light will be illuminated when the OFF- STBY-ON switch is in the ON position? _____

P.I.

ON light

17. Refer to the Interconnections and Tes
Chart (table 2-5) in the MIM for the
trainer and complete the following ta

CABLE NO.	PART NUMBER	FROM
1. W_____	60153	A1J2
2. W9	60085-13	_____
3. W_____	60165	_____
4. W20	_____	

1. W2, A5J3
2. A6A1J3, A3J3
3. W16, A7J1
4. 529600-C60174

18. After performing the visual inspecti
the initial control settings, the ne
of a preflight is the operational ch
An operational check is also perform
ing other inspections, before mainte
to verify a malfunction and followin
maintenance action to insure the mal
has been corrected.

The operational check procedures are
fied in section III of the MIM for t
trainer.

18. (Continued)

The operational check in the MIM consists of _____ columns, entitled _____, _____ and _____ _____.

19. Circle the major steps that are listed in the operational checks table.

a. Initial checks

b. Antenna mode checks.

c. Receiver checks

d. Preflight checks

e. Waveguide checks

f. Tilt checks

g. Display checks

h. Intensity checks

i. Vertical Stabilization checks

j. Transmitter checks

k. Daily checks

P.I.	Module 5-1 Lesson Topi
a, b, c, f, g, h, i, j	20. Two important parts of a preflight in tion are determining: 1. material condition, and 2. the operational condition of the system. List the two parts of the preflight tion for the radar trainer which shou performed prior to turn-on. Refer to section III of the MIM. a._____. b._____.
a. Visual Inspection Procedures b. Initial Control Setting	21. Refer to table 2-6 and figures 2-14 a in the MIM for the radar trainer. Se control settings that cause the STBY to illuminate and the antenna to scc equal number of degrees each side of a. Power switch at ON, ANT Heading ANT mode switch as SCAN. b. Power switch at STBY; ANT Headin ANT Mode switch as SCAN. c. Power switch at STBY; ANT Headin ANT mode switch at STOP.

22. A technician may find that the system does not function properly during an operational check. To determine the cause of the malfunction, the technician will perform further checks that are necessary to determine the cause of the trouble.

The technician should carefully evaluate the operation and visual indications of the system under test during the operational check and then determine the additional checks and tests to perform.

The Functional Checks Table is located in section III of the radar trainer MIM and lists the most frequent malfunctions or more difficult malfunctions that occur.

The Functional Checks table consists of four columns:

1. The FAULT column lists the faults.
2. The Probable Cause column lists the probable defect for each fault.
3. Major Test Points column lists the major test points that should be checked for each fault.
4. The Corrective Action column lists the recommended corrective action to be taken

	22. (Continued) Refer to the Functional Checks table an the major test points to check if ther no range marks. _____ _____
6 23	23. List the major test points for a fault cation of unequal spacing between the marks. _____ _____ ___
2, 111, 112	24. An operational check is performed to d mine the operational condition of an a ics system. It should be done in acco with the Operational Check procedures fied in section III of the MIM for the system being checked.

24. (Continued)

Refer to the Operational Checks Table in the radar trainer MIM. Select the major steps listed in the Procedure column of the Operational Checks Table.

a. Daily checks

b. Transmitter checks

c. Vertical stab checks

d. Intensity checks

e. Display checks

f. Tilt checks

g. Waveguide checks

h. Preflight checks

i. Receiver checks

j. Antenna mode checks

k. Initial checks

---

e, k

25. Refer to the MIM for the Airborne Search Radar Trainer Device 15A21. List the two major sub-divisions of the Pre-flight Inspection tables.

a. _____

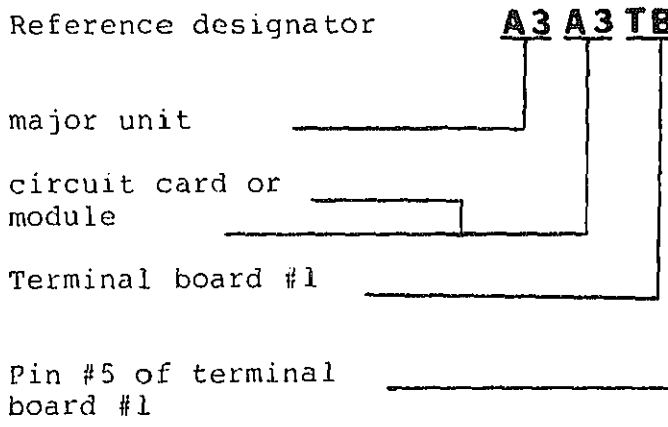
b. _____

a. Visual Inspection Procedures

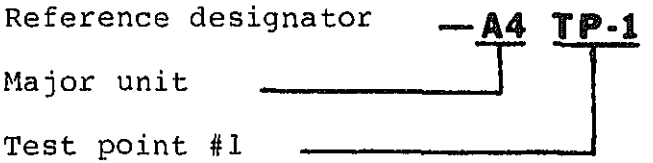
b. Initial Control Settings

Once the location reference designato
been identified, the next step is to
mine the test point location by inte
the reference designator code.

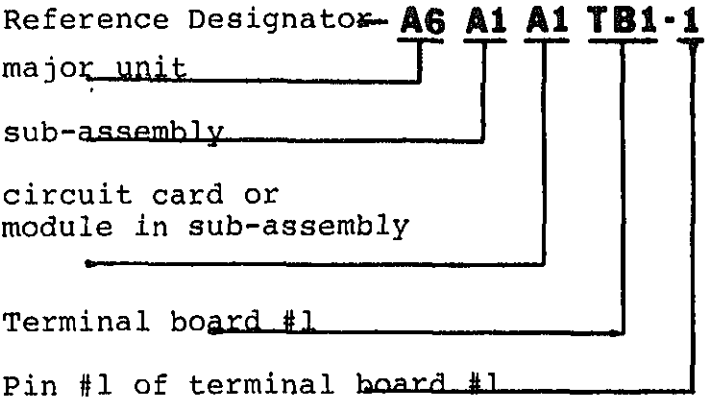
The following is a breakdown of an e
reference designator to show what ea
represents.



Some test points are located externa
of the major unit and use test jacks
test jacks are identified in a simil
manner.



When it is necessary to check a test point on a card, the following example applies:



In this example, the actual test

be at an input/output connector,

etc.

The following designators are com

TP - - - test point

TB - - - terminal board

X- - - - circuit card or subunit connector

E- - - - voltage test point

J- - - - jack

S- - - - switch

NO RESPONSE REQUIRED

26. Once the major test point or test

is/are determined for a specific

next step is to determine the loc

each test point. In the MIM for

trainer, a table provides a list

major test points which specifies

test point, location designator a

cription of the normal indicatio

List the location and descriptio

test points 6 and 23.

-5
ks

nge
ut
tor

27. The location and description of major test points 63 and 116 are:

_____ _____

_____ _____

t

A2-3

rol
yn-

28. When a technician determines that an avionics system does not meet performance requirements, the next step is to determine the cause of the trouble. Organizational maintenance consists mainly of isolating malfunctions to a defective major unit, and performing the required corrective maintenance.

Section III, Organizational Maintenance, provides a Functional Checks Table to provide guidance in performing the troubleshooting process to isolate a malfunction to a defective major unit.

	28. (Continued) Refer to the Functional Checks tabl list the major test point(s) to che the following fault. FAULT — MAJOR TEST PO No range marks — _____, _
6, 23	29. Refer to the Operational Checks tab MIM. Circle the major steps from t list, that are listed in the Proced column. a. Initial checks b. Preflight checks c. Display checks d. Daily checks e. Antenna mode checks f. Tilt checks g. Receiver checks h. Vertical stabilization checks i. Waveguide checks j. Intensity checks k. Transmitter checks.

e, f, j, k

30. Section III of the MIM for the radar traine provides a table entitled "Functional Check Major Test Point Waveforms" which consists of three columns. The Test Point column lists the major test points in numerical order. Major test points are star enclosed Arabic numbers.

The second column lists the Location Reference Designator for each test point and the Waveform/Normal Indication column lists the waveform or voltage value for each test point.

Refer to table 3-8 in the MIM. The locatio designation for the following is _____.

1-5

31. Obtain the specific information for the

P.I.	
47 +.2v 7 + 12vdc	32. The listing of the major test information on the location a indications of each major tes Determine the location and de major test points 3 and 120.  LOCATION DESC _____ ___ _____ ___
3 A3A2TB1-6 1kHz Sync trigger 120 A6A1A1TB1-5 +225-250vdc input to mod	33. Circle the major test points on the Functional Checks tabl FAULT stating that the antenn rotate in SCAN mode. a. None b. 72, 85 c. 85, 91 d. 91, 98, 117

34. Intermediate maintenance is more involved than Organizational maintenance. A technician must be able to perform troubleshooting steps necessary to isolate the cause of each specific malfunction to a module, stage, circuit, and often to a component in a circuit.

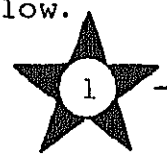
Section IV of a MIM provides the necessary information to maintain a system at the intermediate level of maintenance.

The secondary test point tables are in section IV of the MIM. These test points are identified by a capital letter enclosed in a circle, i.e. Ⓐ

The Secondary Test Points and Indications table in section IV of the MIM consists of two columns. The Test Point and Location column lists the secondary test points and the reference designator for each secondary test point. The Indication column lists the nomenclature of the signal and specifies or illustrates the normal indication for each test point.

	The reference designator for sec test point (A) is _____
A1 TP-3	35. List the nomenclature for second point (H) _____
AZ tach signal.	36. The Functional Check - Major Tes Waveforms provides information a location and the waveform or nor cations of the major test point. a. PS2-TP8 is the location of t test point 12. What is the or nomal indication for this point?_____ b. A4-TP1 (major test point 18) two waveform indications sho What is the P/P amplitude of each waveform?_____ _____.

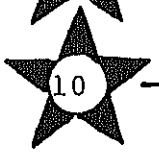
37. Refer to the Listing of Major Test Points table. List the reference designator and description for the major test points listed below.

a. 

_____

b. 

_____

c. 

_____

38. Another group of test point symbols is included in section IV to identify test points that are used to perform measurements within stages, circuits, or electrical components such as switches, synchros, motors etc.

Minor test point symbols consist of a capital letter followed by an Arabic numeral enclosed in a circle, as shown in the following examples:

(A1) (A2) (A3) etc.

(B1) (B2) (B3) etc.

38. (Continued)

As shown, minor test points are sequ
alpha-numerically. Typical examples of
test points are signal injection and
points of a stage/circuit for a chec
measurement of gain, specific voltag
resistance test points, and other po
used in checking for a trouble in an
specific circuit.

The Minor Test Points table in secti
the MIM is arranged in sequence by m
units.

Refer to the Minor Test Points table
the reference designation for each o
test points listed below.

TEST POINT	REF. DESIG.	INDIC
a. (A1)	_____	81kHz s
b. (B3)	_____	composi
c. (B9)	_____	resolve

39. Refer to the Radar Test Points Tables in Section IV of the MIM.

List the Reference Designator and the Nomenclature for:

	TP	REFERENCE DESIGNATOR	NOMENCLATURE
a.	(B1)	_____	_____
b.	(B11)	_____	_____
c.	(C3)	_____	_____

40. Section IV, INTERMEDIATE MAINTENANCE, in a MIM provides the necessary information to perform troubleshooting, circuit alignment, and repair of internal circuitry of major units.

Secondary test points in the MIM for the radar trainer are easily identified on block, schematic and wiring diagrams by a symbol, such as (A), (B), etc, a capital letter enclosed in a circle.

A table in the MIM for the radar trainer entitled "Secondary Test Points and Indications Table," provides a listing of applicable secondary test points.

40. (Continued)

Refer to the secondary test point table in the MIM and complete the following:

	TEST POINT	LOCATION	
a.	(G)	_____	Freq. of signal_____
b.	(I)	_____	time of saw-tooth slope for 25/5 ran _____

A1A1MG1-8, 400 Hz.

A3A2TB1-2, 320 usec.

41. Refer to the Functional Check-Major Test Point Waveforms and list the information required for each of the below major test points.

a. (1) PRT=_____.

b. (2) Sweep amplitude = _____.

c. (120) _____vdc to modulator.

000 usec

4.3 volts

225-250vdc

42. Maintaining avionics systems in top-notch condition is often very difficult. To re duce this difficulty, outlined procedures for troubleshooting, performance testing and alignment are provided in section IV

42. (Continued)

Each major unit has the performance tests and alignment procedures combined so that each abnormal indication may be corrected. Refer to the Performance Tests and Alignment Procedure in the MIM and complete the following statements.

Which paragraph describes the performance tests and alignment procedure for the:

a. Synchronizer unit _____.

b. Display-indicator _____.

c. Transmitter section _____.

---

43. When aligning the synchronizer, you check the Range Marks. The 2-20 Range Control is fully CW, and the Range Switch is set at 2-20/1.

a. at A3A3 TB1-7 you have 250 microseconds. This is a normal/abnormal (circle one) indication.

b. at A3A3 TB1-1 you have 14.48 microseconds. This is a normal/abnormal (circle one) condition.

b. abnormal

to a stage, circuit, or part are made a
minor test points. Minor test points a
identified by a capital letter followed
by an arabic numeral, (A1) (B1) (C1)

Refer to the minor test point table in
MIM and list the nomenclature and locat
code for each of the minor test points
listed below.

	LOCATION	NOMENCLATURE
a. (B6)	_____	_____
b. (D4)	_____	_____
c. (B11)	_____	_____

and Indications Table in the MIM. Label the following test points with their location and indication.

		LOCATION	INDICATION
a.	(A)	_____	_____
b.	(M)	_____	_____
c.	(AA)	_____	_____

46. Many troubles in an avionics system cannot be corrected by performing adjustments/ alignments because a component has failed. When a component has failed, it must be located; then repaired or replaced as applicable.

Section IV of a MIM for an aircraft provides troubleshooting charts for the systems installed in the aircraft.

Section IV of the MIM for the radar trainer has a seperate troubleshooting table for each major unit. The test points in each table lists the test points necessary to isolate each malfunction to an applicable

circuit, card, or stage.

Refer to the Synchronizer Troub
and Display-Indicator Troublesh
tables.

List the corrective action for
troubles specified below.

a. SYNCHRONIZER.

TROUBLE	PROBABLE CAUSE
Loss of 1 kHz output.	step 2a

b. DISPLAY INDICATOR.

TROUBLE	PROBABLE CAUSE
No video	step 2.

he A3A1 ard.	in the MIM. Complete the chart below wit
epair/ eplace he video ain con- rol card	the probable cause and corrective action for the troubles listed.

a. Modulator A6A1 Troubleshooting.

TROUBLE	PROBABLE CAUSE	CORRECTI ACTION
No 1kHz output in system operation mode.	1.	1.

b. Receiver-Transmitter A6A2 Troubleshoo ing.

TROUBLE	PROBABLE CAUSE	CORRECTI ACTIO
Manual tune inop.	1.	1.

c. Power Supply Inverter PS1 Trouble- shooting.

TROUBLE	PROBABLE CAUSE	CORRECTI ACTIO
No 22.5 vdc output	1.	1.

ERS:

Systems Independent Operation Switch; Replace A6A1A1 card.

Defective AFC Integrator A6A2A9; Replace A6A2A9.

Defective Power Supply; Replace F1 on Power Supply.

P.I.	48. Outlined procedures for trouble performance testing and alignme radar system are found in secti the MIM. If, for instance, you wanted to the transmitter operating frequ test equipment used to make the the _____. The indicati observed is _____ _____ _____ _____
TS488A maximum meter deflec-tion on the echo box meter while tuning the TS488A tuning control knob.	49. Refer to the Minor Test Points the MIM and list the location a tion for the following test poi LOCATION a. (A1) _____ ___ b. (A5) _____ ___ c. (B10) _____ ___

contains functional diagrams, wiring diagrams, and schematic diagrams.

The functional diagrams depict the major signal flow paths between the major units of the avionics system.

Refer to the functional block diagram in the MIM for the radar trainer.

List the inputs to the synchronizer unit.

a. _____.

b. _____.

c. _____.

d. _____.

e. _____.

51. Refer to the Functional Block Diagram (sheet 1 of 9). The Bootstrap sweep return is an output of the A4 Unit.

TRUE/FALSE.
(circle one)

	useful to a technician in the is of a malfunction to a module/cir stage, or circuit component. Th shooting tables in section IV ar for each of the major units of t trainer. Refer to the Display-I Troubleshooting table. There are no range marks on any is the corrective action if majo point 23 checks normal and secon point (M) checks abnormal? _____ _____
Replace the A4?1 card.	53. Refer to the Performance Tests a ment procedure in the MIM. Comp following specifications concern dual units within the airborne s trainer. a. Negative Sweep Gate A3A2 TB1 Range. PW= _____ b. Transmitter (Magnetron) Freq _____ ± MHz.

and are used to show the signal/voltage distribution between major units and between subassemblies or modules within major units. (Refer to the Power Distribution Diagram.)

The signal/voltage is identified for each wire in the interconnecting cables shown on the power distribution diagram. Each cable is identified by a code; W1, W2, W3, etc. Jacks are identified as J1, J2, J3, etc. and are normally connected to corresponding plugs, identified as P1, P2, P3, etc.

The wires in each cable are attached to male or female connectors in the plugs at each end of the cable. Each connector in the plug and jack is identified by upper or lower case letters.

Refer to the Power Distribution Di

List the signal/voltage or other i

tion shown on the lines between th

designated cable and pin connector

	CABLE	PIN CONNECTORS	SIG VOL
a.	W19	E of P1-P2	
b.	W10	L of P1-P2	

a. 115 vac 60 Hz Lo.

b. +300 vdc.

55. Refer to tne Power Distribution Di

Device 15A21.

List the input voltages applied th

W17 to the low voltage power suppl

from the Radar Set Cont ol, Unit A

system operation.

to another can be easily seen by referring to the Functional Block Diagram.

If someone were to say that the 15A21 radar trainer has a 208v, 3 phase power input, would they be telling the truth? YES/NO. If yes, where is the input applied? If no, what is the input power? _____.

57. Refer to the appropriate unit troubleshooting tables in the MIM. List the probable cause and corrective action for:

TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Loss of the 1 kHz output.	1.	1.
	2.	2a.
		2b.

ANSWERS:

Probable cause:

1. Synchronizer Power Supply fuses F1, F2, F3, F4.
2. Output of resolver Driver Card A3A1.

Corrective action:

1. Replace fuses.
2a. Replace A3A1 card.
2b. Repair/replace XA1.

58. After the troubleshooting of an a system has been completed, the de tive major unit, module/circuit c component part must be repaired c placed.

An Illustrated Parts Breakdown (provided for aircraft and avionic This lesson topic provides an exp of an IPB for avionics systems us IPB for the airborne search radar as an example. The format of an sists of four sections: 1. Sec the Introduction; 2. Section II Group Assembly Parts Lists; 3. is a Numerical Index and; 4. Se is the Reference Designator Inde section I of the IPB before proc

is The Group Assembly Parts List which consists of figures and tables.

The figures are used to depict the physical location of components in the major units and the modules/circuit cards. When it is necessary to locate a component part, refer to the table of contents for section II to determine the figure and page number for the major unit, module/circuit card in which the component, is located. As an example of this; suppose that the antenna reflector is damaged and you need to determine the part number and description so that a new antenna reflector can be ordered. The table of contents lists figure 1, sheets 1 and 2, on pages 2-1 and 2-2 respectively. Figure 1, sheet 1 of 2, depicts the antenna reflector which is identified as INDEX number 2.

The second part of The Group Assembly Parts List is a table consisting of four columns entitled: 1. Figure and Index Number; 2. Part Number; 3. Description;

and 4. Units per assy (assembly)

The Figure and Index Number colum
all the index numbers for the com
illustrated in the referenced figure. I
ple; the antenna reflector is locate
and its index number is 2 ; locate
the Figure and Index Number colum
part number is listed in the colu
diately to the right. In this ex
the part number is 2803-1. The d
is; Reflector, Antenna; Al (52926
as shown in the Description colum
as shown in the Unit per Assy col
there is 1 reflector.

Refer to the group assembly parts
the IPB and list the part number
waveguide horn assembly, item 12
side view _____.

is defective and needs to be replaced. List the information in each of the blank spaces, as shown in the group assembly parts list of the IPB.

a. Figure and Index number _____.

b. Part number _____.

c. Description _____.

d. Units Per Assy _____.

---

60. Refer to the Power Distribution Diagram, Device 15A21.

The 26 vac and 115 vac, 400 Hz applied to the Antenna Control, Unit A8, is from:

a. Radar set control.

b. Antenna A1 unit.

c. Inverter power supply, PS1 via W19.

d. Simulated vertical reference gyro, A2.

	Airborne Search Radar Trainer. Ma point 6 is the a. bootstrap sweep return to the b. range marks video out of the s nizer. c. composite stabilization signal d. pitch reference. e. AFC crystal current.
b.	62. There are situations when a techni a part number for a component and determine the physical location ar a description of the component. T done by using the Numerical Index, III of the IPB, to cross reference Figure and Index number. Refer to III and locate part number 529260C notice that the Figure and Index n 1-12. When two or more Figure and numbers are given the number used from the Board, Card, or Assembly work. Now go back to the Group As Parts List. You may go directly t figure to determine the location,

62. (Continued)

go to the table and look up the description and units per assembly.

In the above example 1-12 is the

_____, _____ _____;

_____-_____GHz, average

power _____.

63. Material Control wants the description and the Figure and Index number of a part that was previously ordered for the A3A1 Resolver Driver Card.

The part number is RCR07G201JS. List the figure and index number, _____ and the description, _____

_____.

Resistor, fixed, composition; 200 ± 5%, 1/4 watt.	defective and needs to be replaced. S the list below, the information that i in the Group Assembly Parts List. Figure & Index No. / Part No. / Descrip-tion a. 1-27 CPV09AlKE184km Capacito Fixed b. 1-28 CH09AlNC475k Capacito Fixed c. 1-29 CH09AlNC335k Capacito Fixed d. 1-30 CH09AlNE224k Capacito Fixed
c.	65. Refer to the Power Distribution Diagra Device 15A21. The input voltage to the modulator pow is routed from the radar set control v a. W14. b. W18. c. W15. d. W16.

on an avionics system, he often knows the reference designator for a component that needs to be replaced. For example, if a technician is troubleshooting the sweep generator card and discovers C4 is defective. The complete reference designator for C4 is A3A2C4 since it is located on the A2 card of major unit A3.

The Reference Designation Index, section IV in the IPB, provides a listing of the reference designators in alphanumerical sequence with the applicable part number and figure and index number listed for each reference designator. The part number for A3A2C4 is listed as: CQ09A1MA333J3 and the figure and index number is listed at 6-9 .

The technician can use this information to determine the description as stated in the group assembly parts list.

	The part number for A3A2C4 is listed section IV as CQ09A1MA333J3 and the figure and index number is List the part number and figure and i number for A3A1C7. a. Part number _____ b. Figure and index number._____
a. M39003-01-2353. b. 5-11.	67. A technician discovers that the A3A1 (resolver driver card) is beyond repa and must be replaced. List the part number and description. a. Part number_____ b. Description_____

known and additional information is needed about that part, the technician should refer to the Numerical Index to cross over to the figure and index number. Then, look up the location or description in the Group Assembly Parts List.

Where is the part number 529260C60030 located and what is its description?

Location _____.

Description _____.

69. A technician finds that the range marks generator card has been damaged and must be replaced. Refer to the IPB and select from the list below the correct information listed in the group assembly parts list.

	PART NUMBER	DESCRIPTION
a.	529260C60033	Printed board.
b.	529620C60303	Printed wiring board.
c.	529260C60033	Integrated Circuit.
d.	529260C60033	Circuit Card Assembly.

	reference designator of a major unit, module/circuit card/assembly or compo part, he can refer to the Reference D nation Index to obtain the part numbe figure and index number. The figure index number can be used to determine description listed in the Group Assem Parts List, section II of the IPB. List the description and part number the component represented by A4A2CR1. a. Description _____. b. Part Number _____.
a. Semiconductor device, Diode. b. 1N914.	71. Refer to the IPB and select from the below the correct component location component description that is represe by part number 529260C60035. a. Display-indicator, resistor, fixe b. Synchronizer unit capacitor, 100 c. Synchronizer unit, Circuit Card Assembly, Generator, sweep. d. Synchronizer unit, Printed wirin board.

Select the part number and component description from the list below that is represented by A4A2U1 designator.

a. U5B770939X, Integrated circuit.

b. U5B780949X, Integrated transistor.

c. U5B771031X, Integrated circuit.

d. 529260C10097, Printed Wiring board.

At this point, you may take the lesson topic progress check. You may find it beneficial to review the objectives for this lesson topic. If you answer all self-test items correctly, go on to the next lesson topic. If not, select and use another medium of instruction, narrative, or consultation with the learning supervisor, until you can answer all self-test items on the progress check correctly (achieve lesson topic learning objectives) and then proceed to the next lesson topic.

AVIONICS TECHNICIAN COURSE, CLASS A1

UNIT 5

MODULE 1

LESSON TOPIC 3

INTERCONNECTING WIRING DIAGRAMS

LESSON TOPIC 5-1-3

INTERCONNECTING WIRING DIAGRAMS

on you will learn about the importance of interconnecting
ams to the maintenance technician in the performance of
ntenance tasks. You will learn how to use the information
the interconnecting diagrams.

objectives for this lesson are as follows:

from a list, the information shown on an interconnecting
, given a maintenance instruction manual of the airborne
radar trainer.

from a list, the information shown on the interconnection
t cables table, given a maintenance instruction manual of
borne search radar trainer.

from a list, the cable identification numbers for designated
between the major units of the airborne search radar trainer
, given the plug/jack reference designators and MIM.

o the interconnecting diagrams in the airborne search radar
MIM. Match specified voltages and signals to the proper
ce designator for the interconnecting cable or plug/jack
or.

bjectives in this lesson topic must be accomplished with
ercent accuracy, unless otherwise stated.

inning this lesson topic, carefully review the "List of
ces". Keep in mind that your learning supervisor can be
luable learning resource. Always feel free to consult with
ave problems or questions.

To learn the material in this lesson topic, you may choose, acc to your experience and preferences, any or all of the followinc lesson topic presentations.

WRITTEN LESSON TOPIC PRESENTATIONS IN MODULE BOOKLET:

1. Lesson topic summary.
2. Programmed instruction form of lesson topic.
3. Narrative form of lesson topic.
4. Lesson topic progress check.

ADDITIONAL MATERIALS REQUIRED FOR SUCCESSFUL COMPLETION OF LESS

1. Job program in Job Program Booklet
2. Student response sheets
   a. Job Data sheet.
   b. Answer sheet for use with test.
   c. Programmed instruction response sheets.

ENRICHMENT MATERIALS:

1. Airborne Search Radar System Training Device (15A21) Maintenance Instruction Manual

All the resources listed above are available and may be used a fit. Your learning supervisor represents a most valuable lear resource. Use him when you need help. It is not necessary to resources to achieve the learning objectives for the lesson to lesson topic progress check is your means for determining when achieved the objectives. The progress check may be taken at a and is graded by you. If you fail to achieve any objective at topic level, you will plan and accomplish your own remediation you need help in remediation planning, consult your learning s

INTERCONNECTING WIRING DIAGRAMS

rconnection Diagram figure 2-3 in the MIM, provides the following
ion:
llustration that depicts the relative position of the major units.
cables between the major units.
plug/jack connectors on the major units.

rconnection and Test Cables Chart (table 2-5 in the MIM) provides
wing information:
e reference designators.
number for each cable.
/jack reference designators.

e numbers shown on the Interconnection and Test Cable tables
d to the numbers printed on the cables. When performing maintenanc
em, care must be taken to insure that all cables are connected as
the table to prevent incorrect operation or damage to the equip-
e Interconnecting Wiring Diagram for the radar system, figure 5-3,
, 2, and 3) lists the reference designator and nomenclature for
r unit. Additionally, each interconnecting cable is identified
reference designator, and each wire is labeled with the appro-
ltage or waveform for that wire.

oint, you may take the Lesson Topic Progress Check. If you
l self-test items correctly, go on to the next Lesson Topic. If
ct and use another medium of instruction for the Lesson Topic:
d Instruction, Narrative, or consultation with Learning Super-
til you can answer all self-test items on the Progress Check
(achieve Lesson Topic Learning Objectives) and then proceed to
Lesson Topic.

When troubleshooting, technicians are required to determine malfunction within a given avionics system. Following an op check, further checks are made which may include signal trac tinuity checks, and visual checks. When the cause of the ma determined, the appropriate corrective action is taken.

This lesson topic provides an explanation of the tables and MIM that should be used as a guide to hook-up the cables bet units to perform signal tracing or continuity checks between the major units of an avionics system.

The relative location of the ten major units that make up th search radar trainer can be determined from the Interconnect figure 2-3 (front and rear views) located in the MIM. Simi are used in the maintenance instruction manuals for actual a aid technicians in determining the location of each unit or given system that is installed in that aircraft.

The rear view of figure 2-3 depicts the reference designator the major units. These reference designators are also used idual illustrations of the major units (figures 2-4 through diagrams, schematic diagrams and wiring diagrams.

On the rear view of figure 2-3 each plug/jack connector on is identified by an appropriate reference designator. The nator for a jack is J (J1, J2 etc.), and the reference desi plug is P(P1, P2 etc.). The external plug/jack connectors attachment of the interconnecting cables which are used to and voltages between the major units.

The proper routing of the interconnecting cables between th represented by lines drawn between the plug jack connectors data is commonly used in troubleshooting an avionics system an aircraft. Use of the interconnection diagrams can save frustration because in most aircraft a cable for a given av may be hidden in a bundle of cables that share a common pat aircraft.

Table 2-5 in the MIM for the radar trainer consists of part interconnection of the cables between the major units of th of table 2-5 lists the special test cables. Table 2-5 shou with figure 2-3 when connecting the cables between the majo reference designator for each interconnecting cable is list column. These reference designators are also used on the i wiring diagrams in section V of the MIM.

x digits also apply to the other part numbers. The part number
le is essential when ordering a new cable or for reporting
nce action after preforming repairs.

e designators that represent the plug/jack connectors, between
terconnecting cables are attached, are listed in the two
ne right side of table 2-5A.

sk of installing the interconnecting cables between the major
adar system, a technician should compare the reference desig-
n cable with those listed in table 2-5A. Next check the plug/
ce designators to insure proper connection between the major

or units and the appropriate plug/jack connectors that cables
re attached to.

Major Unit Designators	From	To
A1 PS2	A6A2J4 A4J2	A1E2B PS2 J2

ams are used by technicians to signal trace or to make continu-
n wires or cables that are connected between major units, or
les/circuit cards within major units.

merous wiring diagram configurations, the complexity of a
diagram is determined by the data that is shown. For example,
of the MIM for the radar trainer, figure 5-2 is a power distri-
am.

s an interconnecting wiring diagram showing interconnection
major units of the system; and figure 5-11 is an interconnecting
am showing the interconnection of subassemblies/modules
cards within a major unit.

nows the voltage distribution between the major units. This
ng diagram is especially helpful in determining the input
oltages of each unit within the system. This type of wiring
tremendous asset to a technician in performing continuity
e interconnecting cables between the major units of an avionics

Each major unit is represented by a box formed by dashed lines. F
1 is a sample taken from figure 5-3 (sheet 2 of 3) in the MIM, whi
typical of the information shown on interconnecting wiring diagram
show interconnection between major units.

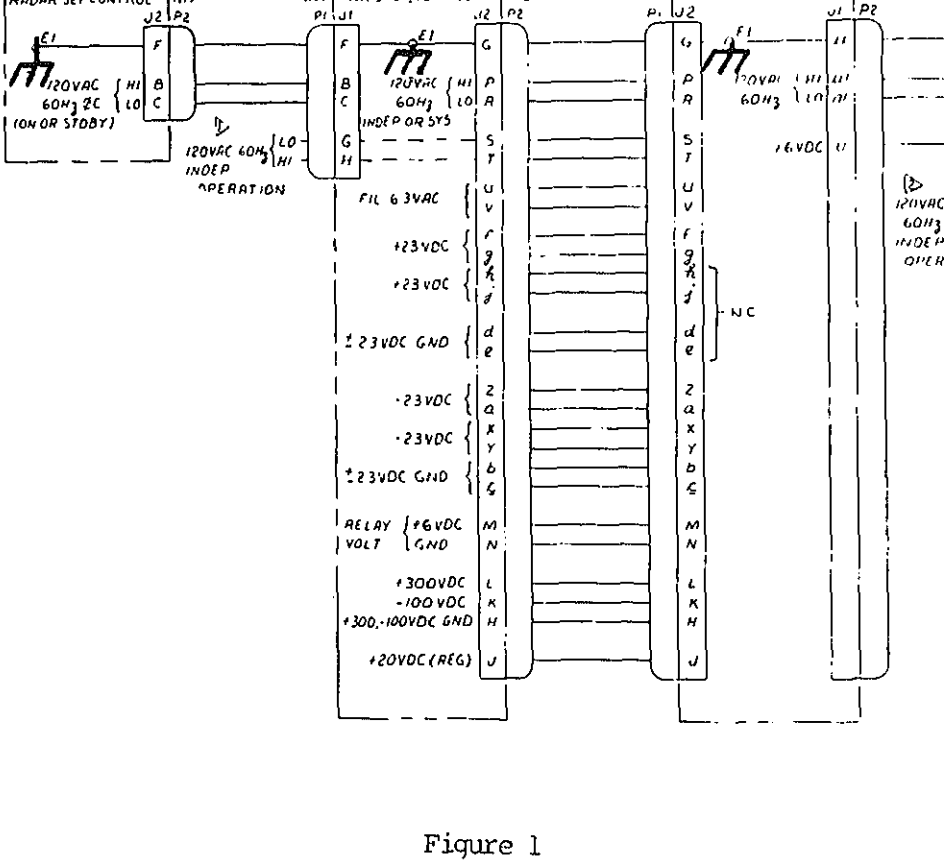


Figure 1

Each major unit on a particular wiring diagram is identified by a
designator, its nomenclature (name), and usually the part number
as depicted in figure 1.

Each major unit may be illustrated two or more times on a single
diagram for clarity in showing the various connections between a
unit and other units. An example of this is shown in figure 5-3
2, and 3) where the A7 unit appears six times depicting cable con
between the A7 unit and the A6, A8 and PS2 units via cables W15,
and W18.

jack connectors. The jack connectors, designated J1 and J2,
cted to the plug connectors, P1 and P2 respectively. P1 is part
ble W17 and P2 is part of cable W10. Each pin in the plug/
ectors is labeled with an upper or lower case letter or in a
sequence. On sheet 1 of figure 5-3, J5 on the A6 unit and
A2 unit have lower case letters that identify each pin. Jack
cabinet uses numbers for identification of the pins. The
plug/jack connectors use upper case letters.

the lower left hand corner of figure 5-3, sheet 3 of 3. On
, the function of each wire is labeled. Cable W15 is connected
7J5 on the Radar Set Control A7 unit and A6A1J2 of the MOD-
ROUP in the A6 unit.

ecting wiring diagrams are used for a complete major unit or
to depict signals, voltages and control paths within the major

figure 5-11 in the MM which is an interconnecting wiring diagram
dar display indicator, A4 unit. Wiring diagrams for a given
t differ very little from those for a complete system. Each of
es, subassemblies or circuit cards are identified by a box
solid lines.

ifference is that each connector of a circuit card consists of
racters. For example, the connections on the video amplifier
the CRT control card are XA1 and XA2 respectively.

or more sheets are used for a given major unit, letter designators
to show continuity of signal, voltage, or control paths. For
on figure 5-11, (sheet 1 of 2), the $\pm$ 12 v dc ground circuit is
o pin 4 of XA1, pins U and T of XA2 and to pin H of J2. The
ne for these points is designated (a). Locate (a) on the left
the next sheet, figure 5-11 (sheet 2 of 2), notice that (a)
ted to pin 15 of XA4, and pins 15 and W of connector XA3.

ethod used to aid technicians in chasing signals or control paths
sheet to another is that each signal or control path is labeled.
ft-center of figure 5-11 (sheet 1 of 2) the "X" sweep feedback
weep feedback input signals are applied to pins A and W respec-
Refer to sheet 2 of 2 of figure 5-11, the origin of the "X"
dback is obtained from the circuit at the right center of the
e origin of the "Y" sweep feedback is obtained from the circuit
wer right of the page.

select and use another medium of Instruction for the Lesson To
Programmed Instruction, Summary, or consultation with the Lea
Supervisor, until you can answer all self-test items on the P
Check correctly (achieve Lesson Topic Learning Objectives) an
proceed to the next Lesson Topic.

INTERCONNECTING WIRING DIAGRAMS

INTRODUCTION

Countless times each day in Naval Aviation, technicians encounter aircraft wiring problems such as broken wires in the middle of wire bundles, wires shorted together, or wires shorted to ground.

The first thing a good technician will do is refer to the aircraft or system interconnecting wiring diagrams. By knowing how to use and understand the information contained in the interconnecting wiring diagrams, the technician can cut maintenance time significantly and help increase aircraft system reliability.

This programmed instruction will give you a basic understanding of the use of the interconnecting wiring diagrams and the information contained in the interconnecting wiring diagrams.

1. Wiring diagrams are designed to provide the electrical and electronic data necessary for clarification of the power distribution, control paths, and signal paths, necessary for making continuity checks and troubleshooting between the major units/assemblies of an avionics system.

   Many avionics systems installed in an aircraft

are very complex, often consisting of nu
units and assemblies. To facilitate m
interconnecting wiring diagrams are norm
in maintenance instruction manuals to sh
data transferred between units or assemb
system.

The organizational and intermediate main
technicians are often required to isolat
that occur in the interconnecting cables
connecting wiring diagrams in section V
borne search radar trainer MIM are simil
found in the MIM of an actual system ins
aircraft. A technician often must deter
routing of the cables between the major
a system. An interconnection diagram is
provided in a MIM to depict the relative
of the major units, the cables between t
units and the plug/jack connectors on th
units.

Examine figure 2-3 in the MIM of the rad
The major units are illustrated in their
positions and are identified by the appli
reference designators.

The interconnecting cables are represent

lines between the plug/jack connectors on the applicable major units.

Refer to figure 2-3 in the airborne search radar trainer MIM.

The major units and plug/jack connectors are illustrated and are identified by the applicable

_____ _____.

The cables are represented by _____ between the applicable plug/jack connectors.

2. Refer to figure 2-3, the Interconnection diagram of the airborne search radar trainer.

List the information shown on the interconnection diagram.

a. The illustration of the airborne search radar trainer depicts the relative position of the

_____ _____.

b. _____ _____ are used to identify the major units and plug/jack connectors.

c. _____ represent the cable connected between plug/jack connectors on the major units.

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The major units are illustrated in their
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The interconnecting cables are represent

lines between the plug/jack connectors on the applicable major units.

Refer to figure 2-3 in the airborne search radar trainer MIM.

The major units and plug/jack connectors are illustrated and are identified by the applicable

_____ _____.

The cables are represented by _____ between the applicable plug/jack connectors.

2. Refer to figure 2-3, the Interconnection diagram of the airborne search radar trainer.

List the information shown on the interconnection diagram.

a. The illustration of the airborne search radar trainer depicts the relative position of the

_____ _____.

b. _____ _____ are used to identify the major units and plug/jack connectors.

c. _____ represent the cable connected between plug/jack connectors on the major units.

b. Reference designators

c. Lines

interconnection of the wires or cables b
the major units/assemblies is provided i
"Interconnection and Test Cables Table."
is located in section II of the MIM for
airborne search radar trainer.

Table 2-5 consists of two parts: table 2
data for the interconnecting cables used
normal operation; table 2-5B lists the d
the test cables.

The data is provided in four vertical co
Beginning on the left of the tables, the
column lists the reference designator in
order, W1 through W20.

The second column lists the part number
cable. The third and fourth columns lis
plug/jack reference designators.

Refer to table 2-5 and list the informat
in the four columns.

a. First Column - _____

b. Second Column - _____

c. Third and Fourth Columns - _____

_____.

and test cables table.

a. Cable reference designator.

b. Major unit reference designators.

c. Part number for each cable.

d. Test point reference designators.

e. Plug/jack reference designators.

5. An Interconnection Diagram of the airborne search radar trainer depicts the relative position of the _____ _____.

Reference designators identify the _____ _____ and _____/ _____ connectors.

Lines between the major units represent _____ connected to the plug/jack connectors of the major units.

major units, plug/jack, cables	figure 2-3, and the Interconnection and Tes Cables tables, 2-5 A and B. The cable numbers shown on the tables corre to the numbers printed on the cables. The nician should refer to the plug/jack refere designator column for each cable to be chec or connected. The cables connected between major units must be connected as shown; oth the radar system will be inoperative or pos damaged. The following problems are provided to give a working knowledge of the Interconnection Test Cable Table 2-5. a. The reference designators for the plug connectors for W7 are_____ and _ b. The cable reference designator for the connected between A7J3 and A8J4 is ___ c. Which units is W9 connected between? (unit reference designators) _____
a. A3J1, A4J1 b. W18 c. A6, A3	7. Which cable is connected between A1J3 and A Refer to the Interconnection and Test Cable 2-5. _____

interconnection of the wires or cables between major units/assemblies is the interconnection and test cables table.

Which data listed below are shown on table 2-5 A and B in the airborne search radar MIM? (circle three).

a. Test point reference designators.

b. Part numbers for major units.

c. Part numbers for the cables.

d. Plug/jack reference designators.

e. Test equipment connections.

f. Cable reference designators.

---

9. Select three items below, shown on the interconnection diagram, figure 2-3, provided in the airborne search radar system trainer.

a. An illustration that depicts the physical location of the maj[illegible] s.

b. Wire designators.

c. Cable designators.

d. Reference designators for the major units and plug/jack connectors.

e. Lines that represent wires or cables.

interconnecting wiring diagrams located in section V of the MIM. You will be using the airborne search radar interconnecting wiring diagram to identify signals and voltages coupled between major unit/assemblies.

You are not expected to memorize any of the signals or voltages on the wiring diagrams. Instead, you will use the diagrams to determine the signals or voltages on wires or cables identified by a reference designator.

The experience you gain in the use of interconnecting diagrams is directly related to the job tasks you may perform on an aircraft or in the work center.

NO RESPONSE REQUIRED

10. Wiring diagrams are used to depict power distribution, control paths, and signal paths between or within major units. This discussion will explain the interconnecting wiring diagrams betwee major units/assemblies of the airborne search radar trainer. To effectively utilize wiring diagrams, a technician m[illegible] interpret the information repres[illegible] The major units are re[illegible] ies that form a block. In[illegible]

nomenclature for the major unit. Outside and directly above each block is the reference designator for the major unit. The part number for the major unit is sometimes shown.

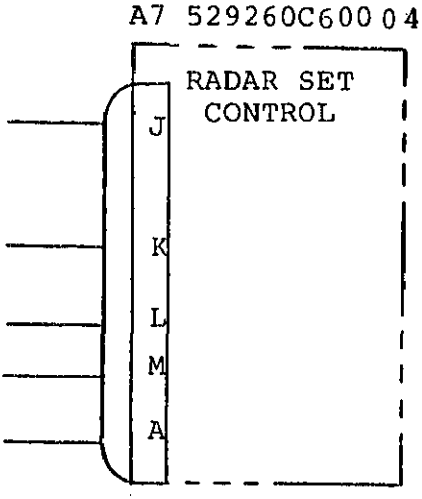


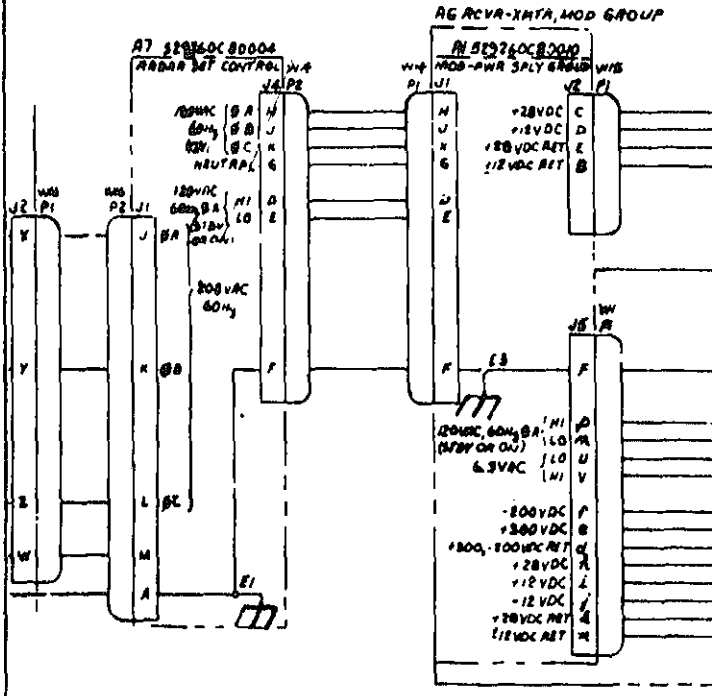
Figure 1

In figure 1, the nomenclature for the major unit is: RADAR SET CONTROL. The reference designator is A7 and the part number is 529260C60004. The interconnecting cables between the major units are assigned a reference designator. In figure 2 on the next page there are four interconnecting cables W1, W14, W15, and W16. Cable W1 is connected between J5/P1 of the A6A1 assembly and P2/J2 of the A6A2 assembly. Cable W15 is connected between J2/P1 of the A6 unit P2/J5 of the A7 unit.

For each plug/jack connector, the "P" represents

10. (Continued)

the plug and the "J" represents the jack. plug is normally part of the cable assembl jack is normally part of the unit assembly Each plug/jack connector has a set of male female pin connectors. Each pin has an as letter or number. The letters may be uppe lower case. The data coupled through each is identified next to each respective pin jack of the source unit/assembly.



10. (Continued)

Refer to the Airborne Search Radar Interconnecting Diagram, figure 5-3, sheet 1 of 3, in the maintenance instruction manual and answer the following questions.

a. What is the primary power input cable reference designator? _____.

b. What is the primary input power to the cabinet? _____.

c. Locate W18 on figure 5-3, sheet 1 of 3 and list the reference designator for the major units and the plug/jack connectors W18 is attached to. _____, _____, _____/_____, and _____/_____.

11. Refer to figure 5-3, sheets 1, 2, and 3, in the Airborne Search Radar Trainer Interconnecting Diagram. Match the reference designators in column A to the appropriate signals and voltages in column B.

Column A	Column B
a. W7P2-h to W7P1-h.	(1) 1kHz CLOCK.
b. W8P1 to W8P2.	(2) 26 VAC 400 Hz (HI).
c. W18P1-D to W18P2-D.	(3) 10 MILE CONT. (Volt-

b. (1) c. (4)	cable table. Which cable is connected betwee A1J3 and A3J5? (Circle one). a. W7. b. W5. c. Q2. d. W3.
d.	13. Refer to the list below and circle three item shown on the interconnection and test cable tables 2-5A and 2-5B in the airborne search radar trainer MIM. a. Test point reference designators. b. Cable reference designators. c. Test equipment connections. d. Plug/jack reference designators. e. Part number of cables. f. Part number of major units.

Airborne Search Radar Interconnecting Diagram. Match the designators in column A to the appropriate signals and voltages in column B.

Column A	Column B
a. W13P2-T to W13P1-T.	(1) -200 VDC.
b. W11P2 to W11P1.	(2) RF.
c. W1P1-f to W1P2-f.	(3) +28 VDC.
	(4) TILT ERROR SIG (LO).
	(5) VIDEO.

15. Refer to the 15A21 MIM interconnection and test cable table. Which cable is connected between PS1J1 and A8J1?

    a. W20

    b. W19

    c. W18

    d. W14

16. Refer to figure 5-3, sheets 1, 2, and 3, Airborne Search Radar Interconnecting Wiring Diagrams. Match the designators in column A to the appropriate voltages in column B.

Column A	Column B
a. W15P1-N to W15P2-N.	(1) NEG. SWEEP GATE.
b. W7P1-s to W7P2-s.	(2) PITCH SIG (LO).
c. W7P1-i to W7P2-i.	(3) -12 vdc.
	(4) ±23 vdc gnd.
	(5) STC DEPTH.

a. (5)
b. (3)
c. (1)

At this point, you may take the lesson topic progr
check. You may find it beneficial to review the
objectives for this lesson topic. If you answer a
self-test items correctly, go on to the next lesso
topic. If not, select and use another medium of i
struction, narrative, or consultation with the lea
supervisor, until you can answer all self-test ite
on the progress check correctly (achieve lesson to
learning objectives) and then proceed to the next
lesson topic.

AVIONICS TECHNICIAN COURSE, CLASS A1

UNIT 5

MODULE 1

LESSON TOPIC 4A

LLATION AND INSPECTION OF AIRCRAFT AVIONICS SYSTEMS, PART 1
NAME PLATE DATA

LESSON TOPIC 5-1-4A

INSTALLATION AND INSPECTION OF AIRCRAFT AVIONICS SYSTEMS, PART 1 NAME PLATE DATA

onics technician you will be responsible for the maintenance
f various avionics systems associated with aircraft in your
activity. This lesson topic will explain the Joint Electronics
tion System and how it relates to the identification of
avionics system. A thorough understanding of the material
this lesson will enable you to locate units in an avionics
little difficulty.

objectives for this lesson topic are as follows:

list of statements, select the statement that describes
pose of the Joint Electronics Type Designation System (JETDS).

from a list the designation for a system.

from a list the information provided by the second letter
equipment indicator.

from a list the designation for a unit.

list of unit indicators, select the unit indicator for
ver-transmitter and an antenna.

bjectives in this lesson topic must be accomplished with
ercent accuracy, unless otherwise stated.

ginning this lesson topic, carefully review the "List of
rces". Keep in mind that your learning supervisor can be
luable learning resource. Always feel free to consult
you have problems or questions.

LESSON TOPIC 5-1-4A

INSTALLATION AND INSPECTION OF AIRCRAFT AVIONICS SYSTEMS, PART 1
NAME PLATE DATA

To learn the material in this lesson topic, you may choose, according to your experience and preferences, any or all of the following writt lesson topic presentations.

WRITTEN LESSON TOPIC PRESENTATIONS IN MODULE BOOKLET:

1. Lesson topic summary.
2. Programmed instruction form of lesson topic.
3. Narrative form of lesson topic.
4. Lesson topic progress check.

ENRICHMENT MATERIALS (topic references):

1. Audio visual materials (as applicable)
2. MIL-STD 196C Military standard, "Joint Electronics Type Designat System (JETDS).

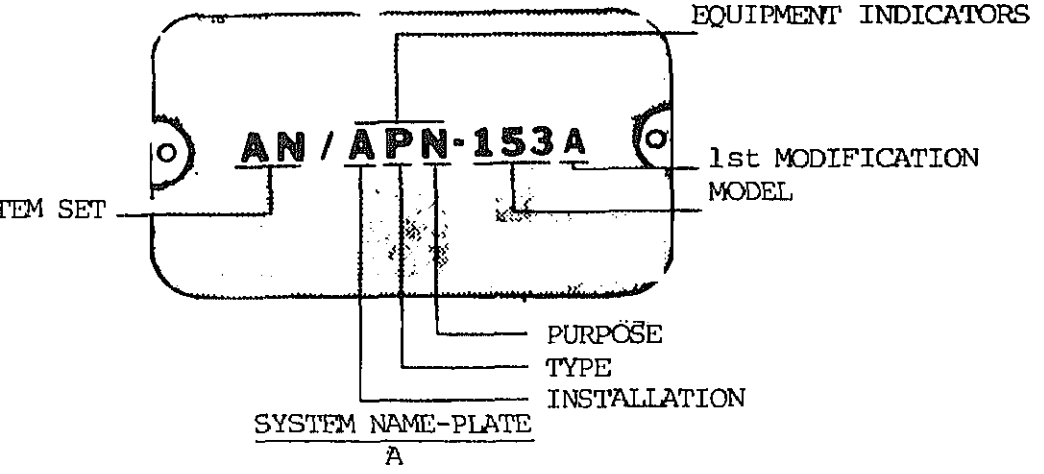
All the resources listed above are available and may be used as you see fit. Your learning supervisor represents a most valuable learnir resource. Use him when you need help. It is not necessary to use al the resources to achieve the learning objectices for the lesson topic The lesson topic progress check is your means of determining when you have achieved the objectives. The progress check may be taken at any time and is graded by you. If you fail to achieve any objective at the lesson topic level, you will plan and accomplish your own remedia If you need help in remediation planning, consult your learning supervisor.

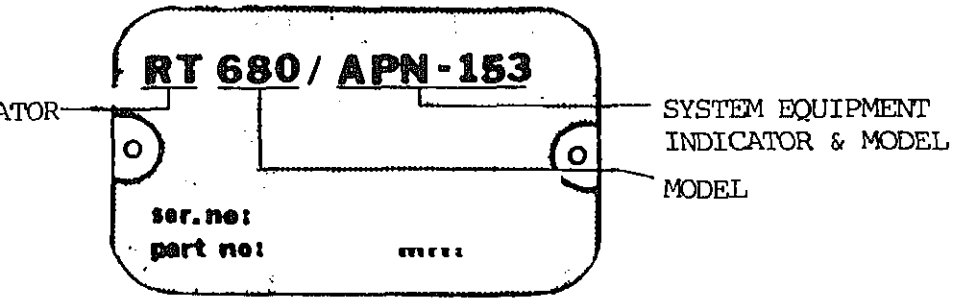
LESSON TOPIC SUMMARY

INSTALLATION AND INSPECTION OF AIRCRAFT
AVIONICS SYSTEMS, PART 1, NAME PLATE DATA

ctronics Type Designation System (JETDS) is the method used
for identifying specific electronic systems, units, or ma-
gh the use of name plates and identification plates. Each
ssembly or module of a system or set has a name plate attached

an example of a name plate for a complete system. The prefix
reference designations for complete systems. The three letter
s the example) is known as the equipment indicators which
Installation, type and purpose of the system. These designa-
nd on the JETDS chart (figure 2) under the heading: Table
Indicators.





UNIT NAME-PLATE
B

Figure 1

letters which represents the purpose/function. These desig
in the table of Unit Indicators on the JETDS chart. The gr
numbers represents the model (680 in the example). The grc
right of the slant sign is the equipment indicator and mode
the unit belongs.

At this point, you may take the Lesson Topic Progress Check
all self-test items correctly, go on to the next Lesson Top
select and use another medium of instruction for the Lesson
Programmed Instruction, Narrative, or consultation with Lea
until you can answer all self-test items on the Progress Ch
(achieve Lesson Topic Learning Objectives) and then proceed
Lesson Topic.

merous electronic systems installed in each naval aircraft. nic system is made up of major units or assemblies (commonly as BLACK BOXES) which can be replaced. Technicians must have rstanding of how to determine the system that each major unit belongs to so proper identification can be entered into the action forms.

ectronics Type Designation System (JETDS) formerly known as the ure system is used by each branch of the service for identi- electronic systems, units, or material through the use of name entification plates.

art provided at the end of this lesson topic consists of three can be used to determine what each designator on a name plate

that are used to identify a complete system, are normally e assembly that comprises the bulk of the system. Actually a tem includes all major units or assemblies (black boxes), ting racks, and other components such as: relays, antennas, , shields etc. The name plate for a complete system is ded by an "AN" designator such as shown in figure 1.

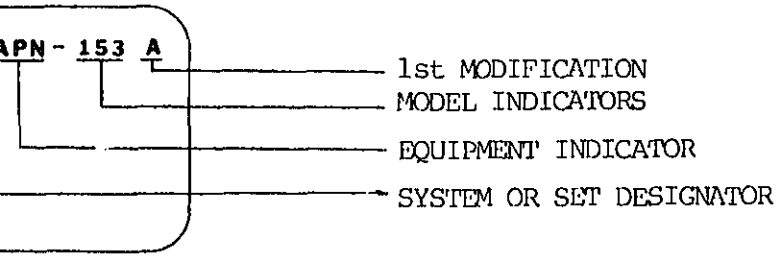


FIGURE 1

t indicator is always a part of a system designator which con- ee letters as shown in figure 1. Figure 2 provides a further the equipment indicator.

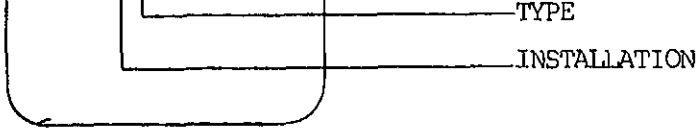
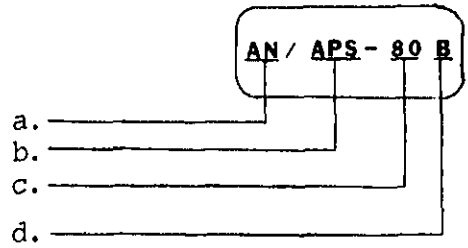


Figure 2

The first letter in the equipment indicator represents where the sys
is installed.

The Table of Equipment Indicators on the JETDS chart lists all appli
INSTALLATION codes. In the example installation designator, shown i
figures 1 and 2, the letter "A" represents PILOTED AIRCRAFT. The TY
designator (letter P in figures 1 and 2) represents Radar. The last
in the equipment indicator represents the PURPOSE of the system, N r
resents navigation.

Each system built by a specific manufacturer for the military is num
sequence. The model number 153 is the 153rd model built for the mil
by this specific manufacturer. If a major modification is made to a
it is assigned a letter designator to represent the modification as
A is 1st, B is 2nd, C is 3rd, etc., Refer to the JETDS chart and li
the correct information for each designator on the following name pl



a. system or set b. equipment indicator
c. model indicator d. 2nd modification

erred to as black boxes which includes control boxes,
eceiver-transmitter units and many others. Other information
d on a name plate is the manufacturers code, serial number

of letters, as shown in figure 3 is the unit indicator. A
dicators is given on the JETDS chart. In the example name
ents a receiver-transmitter unit.

igure 3, 680 represents the 680th model. The APN-153A is
ment indicator and system model and modification designator.

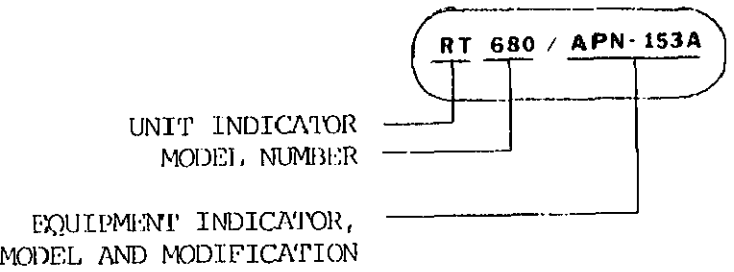
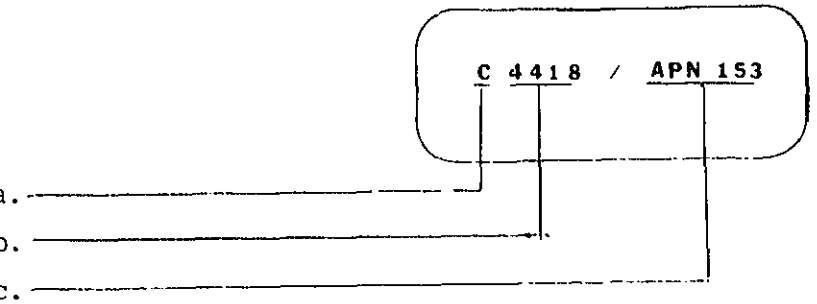


Figure 3

e plate illustrated below and label each designator as
JETDS chart.



b. model c. equipment indicator and model

If not, select and use another medium of instruction for the Lesson Topic: Programmed Instruction, Summary, or consultation with Learn Supervisor, until you can answer all self-test items on the Progres Check correctly (achieve Lesson Topic Learning Objectives) and ther proceed to the next Lesson Topic.

ALLATION AND INSPECTION OF AIRCRAFT AVIONICS SYSTEMS, PART 1
NAME PLATE DATA

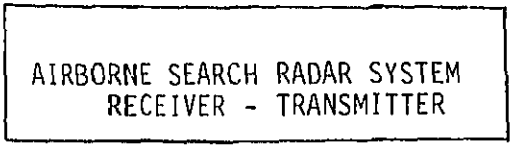
INTRODUCTION

Electronics Type Designation System (JETDS), formerly known
N" nomenclature system, and its procedures are mandatory for
entifying all electronics equipment used by the combined Armed
The system is designed so that its indicators will tell at
many things pertinent to the item or equipment. For example,
whether the item is a complete set or a component, and
ormation such as where it is used, the kind of equipment, and its
When speaking of name plate data, reference should be made
DTS, and its associated procedures and format.

Electronics Type Designation System (JETDS) is very useful
planation of the data normally found on name plates on
c equipment. Before explaining the name plate data
ssociated designators (numbers, letters, etc.), let's first
JEDTS.

of identification of specific electronics systems, units, or material through the use of name plates and identification plates without the use of the FAMILY-NAME portion of the nomenclature. Refer to figure 1(A). Here you can see that if this nameplate were attached to a specific unit, it would be quite large, and would require a sizable mounting area, due to the fact that the entire name is used on the name-plate.

(A)



(B)

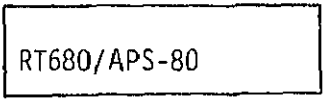


FIGURE 1: EQUIPMENT NAMEPLATES

Whereas, in figure 1(B), the noun-name portion is replaced by the letters/numbers that identify the receiver-transmitter (RT) as specified by the JETDS.

The purpose of the JETDS is to provide a means of identification of specific

name plates and identification plates.

2. TRUE/FALSE (circle one) The purpose of the JETDS is to provide a means of identification of mechanical and electronic systems, units, or material through the use of name plates or identification plates.

3. Although the JETDS is used for the identification of all electronic systems, you will only be concerned with its application to avionics systems. The system was formerly referred to as the "AN" system because system and unit designators were prefixed with the letters "AN." The "AN" designation is still assigned to systems, but units do not retain the "AN" title.

To correctly understand the JETDS format and how the letters are assigned to the systems and units, refer to the JETDS chart.

The chart shows the three basic areas into which the JETDS is broken down. Refer to the example name plate shown in figure 2. This is a name plate that is used to represent an avionics system. The indicator for the complete system (or set)

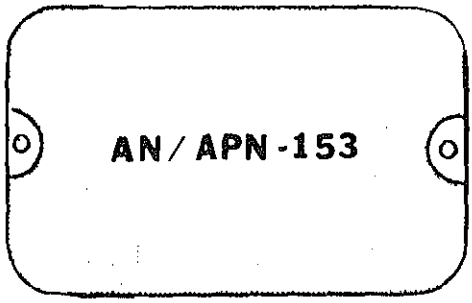


Figure 2: System Designator

begins with the letter "AN." This is followed by a slash and a three letter group. The three letters of the second group give the general na of the installation, the type of equipment, and the purpose of the equipment, respectively. Following the three letter group is a number wh indicates the specific model of the equipment. Thus, the example name plate in figure 2 would describe an airborne radar navigational system.

3. (Continued)

Which of the following would be a designation for a system? (Circle one)

a. MX 3186/ASA-16.

b. PP 3102/APS-80.

c. AN/APN-52.

---

4. TRUE/FALSE (Circle one) The system designation AN/APS-80 represents an airborne search radar system, model 80.

---

5. The purpose of the Joint Electronics Type Designation System (JETDS) is to (Circle one)

a. Provide a means of identification of specific electronic systems, units, or material through the use of name plates and identification plates without the use of the FAMILY-NAME portion of the nomenclature.

b. Provide for easy identification of electronic items that are not commonly found in the FSN catalog.

c. Provide for easy identification and positive control of classified electronic material.

d. Serve as a tool for easy location of electronic items that are necessary to maintenance but that are not commonly supplied to the fleet by individual manufacturers.

	cribes the TYPE of equipment. A P for the second letter would indicate radar. An R would be used for radio, an L would indicate counter-measure equipment. The second letter of the equipment indicator in the system designator AN/APS-80 tells the techn that the system is of the _____ type.
radar	7. In a system, or set indicator, the second lette the second group describes the _____ of equipment being used.
type	8. Which of the following is a designator for a sy (Circle one). a. R648/AIC 32. b. PP3102/APS-80. c. RT384/APX-72. d. AN/APN 152(V).

System (JETDS) is to:

a. Provide a means of identification of specific electronic systems, units, or material through the use of name plates and identification plate without the use of the FAMILY-NAME portion of t nomenclature.

b. Provide for easy identification of electronic items that are not commonly found in the FSN catalog.

c. Provide for easy identification and positive control of classified electronic material.

d. Serve as a tool for easy location of electronic items that are necessary to maintenance but are not commonly supplied to the fleet by individual manufacturers.

10. When an avionics system contains two or more units the name plates on the individual units may resembl the following example (refer to figure 3).

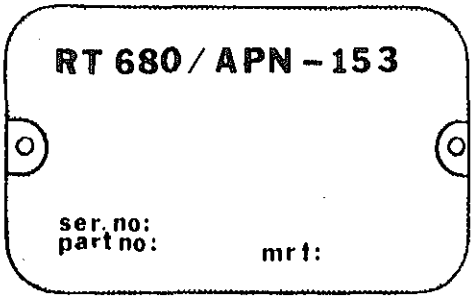


Figure 3: Unit Designator

	The equipment indicator is retained on the name and a unit indicator is added to describe the t of unit being used with the system. Refer to t JETDS summary chart. The table of unit indica lists the letters "RT" as signifying a receiver transmitter unit. The numbers "680" denotes th model number of the RT unit. The lower portion the name plate is reserved for more specific in mation on the unit, such as the serial numbers, part number, and manufacturer's code for that particular unit. TRUE/FALSE. The unit and equipment indicator (Circle one) RT384/ARN 52 is used on a name plate to identif a receiver-transmitter unit in an airborne radi navigational system.
TRUE	11. Which of the following is a unit indicator? a. AN/APS-88(V). b. OA3694/ASA-16. c. AN/APN 122(V). d. RT 680/APN 153 (V).

bes the (circle one)

a. purpose of the equipment.

b. type of equipment.

c. method of installation.

d. equipment classification.

13. Which of the following is a designation for a system?

a. MX 3183/ASA-16.

b. AN/APS-88.

c. PP 3102/APS-80.

d. RT 384/APX-72.

e. R40/VRC-12.

14. When multiple units are associated with the same system, such as shown in figure 4, each unit has its own unit indicator. In this particular example, the system is made up of three units, these being the receiver-transmitter (RT), the antenna (AS), and the control box (C). Notice that the equipment indicator is the same for all three units, because they are part of the APN-153 system. The JETDS summary chart lists the unit indicators assigned for all electronic equipment including MISCELLANEOUS IDENTIFICATIONS THAT MAY BE A PART OF A TYPE

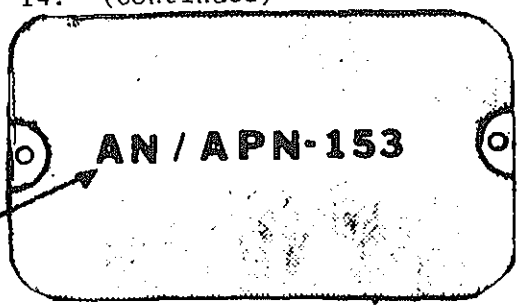
DESIGNATION. (Refer to the miscellaneous iden

fication in the JETDS chart.)

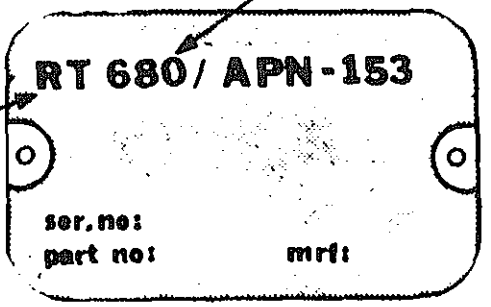
The unit indicator for a receiver-transmitter

_____.

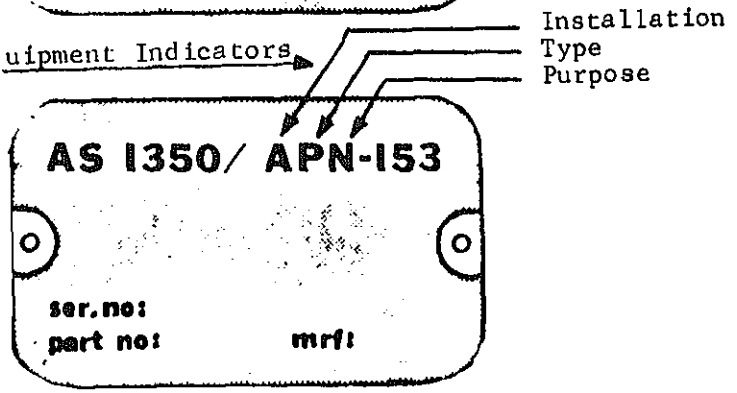
14. (Continued)



SYSTEM NAME-PLATE



UNIT NAME-PLATE



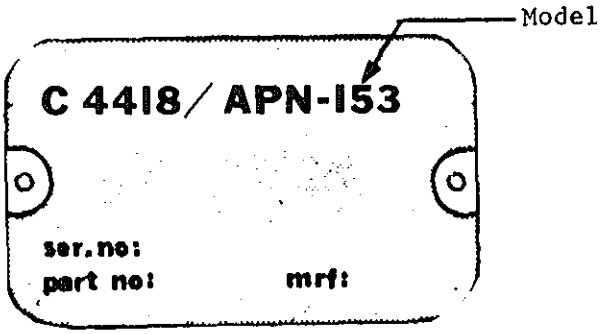


FIGURE 4: System and Unit Name-Plates

an antenna and a receiver-transmitter? (circle one)

a. AS; RT.

b. AT; RS.

c. AR; ST.

d. LS; AT.

e. SA; RT.

16. Circle the correct unit indicator for a computer.

a. CU.

b. MP.

c. CT.

d. CP.

e. CW.

17. The second letter of an equipment indicator describes the:

a. Method of installation.

b. Purpose of the equipment.

c. Classification of the equipment.

d. Type of equipment.

RT.

The unit indicator for an antenna is _____.

19. Which of the following is a designation for a unit?

a. RT 384/ARN 56N.

b. OA-286/A1C-22.

c. AN/APS-80.

d. AN/APN-153.

20. What is the unit indicator for a receiver-transmitter and an antenna?

a. PU; RT.

b. RL; SA.

c. RT; AS.

d. BS; ST.

At this point, you may take the lesson topic progress check. You may find it beneficial to review the objectives for this lesson topic. If you answer all self-test items correctly, go on to the next lesson topic. If not, select and use another medium of instruction, narrative, or consultation with the learning supervisor, until you can answer all self-test items on the progress check correctly (achieve lesson topic learning objectives) and then proceed to the next lesson topic.

AVIONICS TECHNICIAN COURSE, CLASS A1

UNIT 5

MODULE 1

LESSON TOPIC 4B

INSTALLATION AND INSPECTION OF AIRCRAFT AVIONICS SYSTEMS, PART 2

LESSON TOPIC 5-1-4B

LATION AND INSPECTION OF AIRCRAFT AVIONICS SYSTEMS, PART 2

s are considered to be the heart of any preventative maintenance
Minor discrepancies are detected and corrected before they have
o develop into major, time-consuming discrepancies.

liability and life of the equipment is improved due to the
s as well as the continuation of safety for the pilot, crew,
ft.

letion of this lesson you will be able to:

list, select the purpose for performing an inspection on an
cs system.

list, select the reference technicians use to perform inspections.

list, select the discrepancies technicians look for while
ming visual inspections.

list, select the type(s) of inspections performed on an
cs system.

ess otherwise stated in the learning objective, all objectives
this lesson topic are to be completed to 100% accuracy.

eginning this lesson topic, carefully review the "List of
urces" provided. Keep in mind that your learning supervisor
r most valuable learning resource. Always feel free to
m if you have problems or questions.

INSTALLATION AND INSPECTION OF AIRCRAFT AVIONICS SYSTE

To learn the material in this lesson topic, you ma
according to your experience and preferences, any
following written lesson topic presentations.

WRITTEN LESSON TOPIC PRESENTATIONS IN MODULE BOOKL

1. Lesson topic summary.
2. Programmed instruction form of lesson topic.
3. Narrative form of lesson topic.
4. Lesson topic progress check.

ADDITIONAL MATERIALS REQUIRED FOR SUCCESSFUL COMPLETION OF L

1. Job program in Job Program Booklet.
2. Student response sheets.
   a. Job data sheet.
   b. Answer sheet for use with test.
   c. Programmed instruction response sheets.

ENRICHMENT MATERIALS:

1. Aviation Fire Control Technician 3 & 2, NAVPER
   Chapter 18.

2. Maintenance Instruction Manual, 15A21 Radar Tr
   (Organizational Maintenance Section).

All the resources listed above are available and m
you see fit. Your learning supervisor represents
able learning resource. Use him when you need hel
necessary to use all the resources to achieve the
jectives for the lesson topic. The lesson topic p
is your means of determining when you have achieve
tives. The progress check may be taken at any tim
graded by you. If you fail to achieve any objecti
lesson topic level, you will plan and accomplish y
mediation. If you need help in remediation planni
your learning supervisor.

f performing an inspection can be divided into two broad areas.
ermine or verify the material conditions of the system. The
determine or verify the operational status of the system.

that technicians use to perform inspections is the Main-
uction Manual (MIM). While performing a visual inspection,
n looks for three major types of discrepancies. One is any
cal defects. The second is the equipment security. The
s the security of attached parts.

tions described in the MIM, there are three inspections of
est to the organizational maintenance technician. They are:
pection.
Inspection.
t Inspection.

, you may take the Lesson Topic Progress Check. If you
lf-test items correctly, go on to the next Lesson Topic.
t and use another medium of instruction for the Lesson Topic:
struction, Narrative, or consultation with Learning Super-
you can answer all self-test items on the Progress Check
hieve Lesson Topic Learning Objectives) and then proceed to
on Topic.

spections are considered to be the heart of any preventive maintena
ogram. Through inspections, minor discrepancies are corrected befo
ey develop into major time-consuming discrepancies. Also, the syst
liability and service life are improved, thus maintaining the safet
e pilot, crew, and aircraft.

e primary purpose of any inspection is to determine or verify the m
ndition and operational status of the system being inspected. The
llowing example, a true case history, will give you insight into th
portance of aircraft inspections.

A-3 aircraft was suddenly assigned to fly the mission of another a
ift. Although the assigned aircraft was considered to be in a read
atus, it in fact was not. Technicians had removed equipment to fac
te maintenance on other aircraft and had placed equipment received
pply in the aircraft without securing it.

e-half hour before flight, a technician decided to make a final ope
eck of the radar. In the cockpit, he noticed the control box had n
en secured to the panel. After securing the control box, he decide
spect all of the equipment in the system. The technician found sev
re discrepancies, some of which could have done extensive damage to
rcraft, to say nothing of possible injury to the pilot and crew.

e item, weighing 30 pounds, located in the nose of the aircraft, co
ve smashed through the radome as the aircraft landed on the carrier
other item, weighing in excess of 50 pounds, located in the tail s
uld have done damage to other equipment in the tail.

e technician quickly remedied these and other minor discrepancies b
operly securing them. Eight bolts and a length of safety wire were
ems needed, aside from a screwdriver for other securing. If the te
cian had not responded and if the aircraft had been launched, the d
epancies could have been far worse. These discrepancies might have
uded the necessity for a new radome, equipment, pressure lines, wir
ctions of waveguide, and new mounting racks, just to name a few.
uld also be the paperwork required to replace all the aforementione
ems, plus the paperwork required to explain why it happened.

e technician was able to determine or verify the material condition
e system and the operational status by performing an inspection of
rcraft's radar system.

operational

n organizational and intermediate maintenance use the MIM
ecifies the type of inspection, depth of the inspection, and
of the inspection. This information is contained in sections
the MIM. Section III covers the procedures for inspections
the organizational maintenance level. When an inspection
ssembly of a major unit, the procedures are specified in sec-
e MIM. In the operating squadrons, these same inspections are
Maintenance Requirement Cards (MRC). These cards break the
wn into steps to ensure that all areas are inspected with
ooked. Since aircraft are subjected to a variety of stresses,
ations, and environments, if they are not inspected regularly
the aircraft would soon be inoperable. The correction of
ancies and the timely lubrication performed in compliance
ection requirements, improves the reliability of the aircraft
safety for the crew. This can be seen from the preceding
A-3 aircraft.

ing an inspection, the technician should refer to the:
ce Control Register.
ce Instruction Manual.
ed Parts Breakdown.
Block Diagram of the System.

discrepancies found while performing visual inspections are
three basic categories: (1) PHYSICAL DEFECTS; (2) EQUIPMENT
MOUNTING, and (3) SECURITY OF ATTACHED PARTS.

are normally sequenced with specific checks to be performed.
normally include looking for physical defects, security of the
security of attached parts.

cian inspects each piece of equipment, he looks for obvious
CTS. These defects include major damage (dents) caused by
dling, broken or clogged air screens, broken or missing dials,
knobs.

important item to check for during a security inspection is the
per installation of safety wire because vibrations can cause
ts to work loose, which in turn could cause severe damage to the ai

ing the inspection, the SECURITY of ATTACHED PARTS requires that ca
ssure lines, hydraulic lines, waveguides, etc. are examined to er
t they are correctly connected to the equipment. If these parts ar
rectly attached to the equipment, bulkhead, frame or rack, the poss
ity of interference with other systems, such as flight control cabl
increased and can result in possible damage or loss of the aircraft
es.

ch discrepancies should a technician look for while performing a vi
pection of avionics equipment?
Electrical correctness.
Equipment security.
Antenna reception.
Physical defects.
Security of attached parts.

---

d, e

---

re are three inspections of primary interest to the organizational
ance technician. They are:
DAILY INSPECTIONS,
PREFLIGHT INSPECTIONS,
POSTFLIGHT INSPECTIONS.

AILY INSPECTION is performed between the last flight of the day and
t flight, if no more than 72 hours have elapsed between the inspect
the next flight. This inspection is a combination of requirements
the checking of equipment, requiring a daily verification of satis
tory function, plus requirements that prescribe the searching for a
recting of relatively minor problems to prevent their progressing
tate requiring major repair.

PREFLIGHT INSPECTION is performed prior to each flight and consis
checking the aircraft for flight readiness by performing visual che
operational checks to determine that there are no defects or malad
ts that could cause deficient operation of systems resulting in ab
ssions or accidents.

talling aircraft safety devices, and proper security of the
r the last flight.

n performs many types of inspections on avionics equipment.
f inspections are _____ _____, _____
___, and _____ _____.

---

ions, preflight inspections, post flight inspections (any order)

, you may take the Lesson Topic Progress Check. If you
lf-test items correctly, go on to the next Lesson Topic. If
nd use another medium of instruction for the Lesson Topic:
struction, Summary, or consultation with Learning Supervisor,
answer all self-test items on the Progress Check correctly
on Topic Learning Objectives) and then proceed to the next

1. Operating aircraft are subjected to a
ty of stresses, strains, vibrations,
vironments. If it were not inspected
larly for defects, the aircraft would
become inoperable. The correction of
crepancies, in conjunction with inspe
enables the aircraft to be flown safe
mission to mission.

The purpose of performing an inspect
be divided into two broad areas. One
determine or verify the material cond
of the system. The second is to dete
or verify the operational status of t
system.

The material condition refers to the
pleteness of the system with respect
equipment. That is, does the system
all the equipment that it is supposed
have? Also, the material condition
the security of the equipment and its
attached parts.

capabilities of the system. How well does the system operate? Does the system operate as well as it should?

These and other questions are answered by performing an operational inspection on the system, which is one of many types of inspections dealing with the material condition of the system.

The primary reason for performing an inspection on an avionics system is to determine or verify the _____ condition and the _____ status of the system.

2. The primary reason for performing an inspection on an avionics system is to:

   a. determine or verify the operational status of the system.

   b. determine or verify the reliability of the system.

   c. determine or verify the material condition of the system.

   d. both a & c are correct.

   e. both b & c are correct.

(MIM).

The MIM describes the various types of inspec to be performed on the system. The technicia must use Maintenance Requirement Cards in the performance of the inspection. These cards b the inspection down into steps to ensure that inspection is complete in all areas with noth overlooked. This lesson emphasizes the use o the MIM as a guide for the inspection.

What publication should the technician use to obtain information concerning various inspect performed on avionics systems?_____

_____

Maintenance Instruction Manual

4. Before beginning an inspection, the technicia should refer to the:

   a. Maintenance Control Register.

   b. Maintenance Instruction Manual.

   c. Illustrated Parts Breakdown.

   d. Detail Block Diagram of the System.

a. determine or verify the operational status of the system.

b. determine or verify the material condition of the system.

c. determine or verify the reliability of the system.

d. both a & b are correct.

e. both b & c are correct.

---

6. In checking the material condition of an avionics system, the technician is performing a visual inspection of that system. Normally this is accomplished with no power applied to the system, reducing the shock hazard.

During the inspection, the technician is looking for three major types of discrepancies. One is any obvious physical defects. This implies damage to any piece of equipment, broken cables, waveguides, etc. The second is the equipment security. Fasteners should be employed correctly to ensure that the equipment stays put. The third involves the security of attached parts. Waveguides, cables, air pressure lines, and hydraulic lines, etc., need to be secured to the bulkhead or other areas of the aircraft exactly as designated by the manufacturer.

	List the three major types of discrepancie technician looks for in checking the materia condition of an avionics system. a. _____. b. _____. c. _____.
a. Physical defects. b. Equipment security. c. Security of attached parts.	7. Which discrepancies should a technician look while performing a visual inspection of avio equipment? a. Electrical correctness. b. Antenna reception. c. Security of attached parts. d. Equipment security. e. Physical defects.
c, d, e.	8. There are various types of inspections made aircraft systems. Prior to beginning an ins the technician should consult the _____ _____ _____ for that system.

on an avionics system is to:

a. determine or verify the material condition of the system.

b. determine or verify the operational status of the system.

c. determine or verify the reliability of the system.

d. both b and c are correct.

e. both a and b are correct.

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10. Of the inspections described in the MIM, there are three inspections of primary interest to the organizational maintenance technician. They are: (1) Daily Inspection, (2) Preflight Inspection, and (3) Postflight Inspection.

The daily inspection is performed between the last flight of the day and the next scheduled flight, if no more than 72 hours have elapsed between the last inspection and the next scheduled flight. Should this elapsed time exceed 72 hours, another daily inspection is performed.

The preflight inspection is performed prior to each flight. This inspection consists of checking the system visually and operationally.

The postflight inspection is similar to the pr
flight inspection except, as its name implies,
it is performed immediately after the flight.
Three types of inspections performed on an
avionics system are:

a. _____.

b. _____.

c. _____.

---

a. daily inspection

b. preflight inspection

c. postflight inspection

11. The type(s) of inspection performed on avionic
systems is/are:

a. Daily.

b. Preflight.

c. Postflight.

d. All of the above.

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d.

12. Equipment needs to be checked to ensure that i
is securely fastened to the mounting rack. No
only is the safety of the aircraft and its cre
at stake, but also there are some racks that h
electrical connections built into them and mak
contact with the equipment when the equipment
properly secured to the rack. Improper securi
can cause physical damage, as well as electric
damage within the system.

while performing a visual inspection on avionics equipment?

a. Physical defects.

b. Antenna reception.

c. Electrical correctness.

d. Equipment security.

e. Security of attached parts.

13. Before beginning an inspection, the technician should refer to the:

a. Maintenance Control Register.

b. Illustrated Parts Breakdown.

c. Maintenance Instruction Manual.

d. Detailed Block Diagram of the System.

14. The technician performs many types of inspections on avionics systems. Three types of inspections are _____ _____, _____ _____, and _____ _____.

P.I. daily inspection, preflight inspection, postflight inspection. (any order)	15. Which discrepancies should a technician lo while performing a visual inspection on av equipment? a. Electrical correctness. b. Security of attached parts. c. Equipment security. d. Antenna reception. e. Physical defects.
b, c, e.	16. The type(s) of inspection performed on avi system is/are: a. Postflight. b. Preflight. c. Daily. d. All of the above.
d.	NOTE: Read pages 2-1 through 2-32, paragr 3-8 through 3-15 and refer to Table and 3b in the MIM.
	At this point, you may take the lesson topic check. You may find it beneficial to review objectives for this lesson topic. If you ans self-test items correctly, go on to the next topic. If not, select and use another mediun instruction, narrative, or consultation with learning supervisor, until you can answer all self-test items on the progress check correct (achieve lesson topic learning objectives) ar

AVIONICS TECHNICIAN SCHOOL, CLASS A1

UNIT 5

MODULE 1

LESSON TOPIC 5

REMOVING AND REPLACING LINE REPLACABLE UNITS

OVERVIEW

LESSON TOPIC 5-1-5

ING AND REPLACING LINE REPLACEABLE UNITS

m you will learn procedures that are essential
tallation and removal of avionics units and
reat emphasis will be placed on the aspect of
onnel and prevention of damage to the aircraft
cs equipment.

bjectives for this lesson topic are as follows:

st, select the section in the MIM that provides
ation needed to locate the major units in the
earch radar trainer, 15A21.

st, select the section of the MIM that includes
for the removal/installation of major units.

st, select the statement describing the primary
r observing safety precautions.

st, select the purpose of tagging unidentified

st, select the purpose of visually checking a
jor unit.

st, select the purpose of accounting for all
safety wire when working on an avionics system.

st, select the purpose of ensuring that major
properly installed in aircraft.

ectives in this lesson topic must be accomplished
0 percent accuracy, unless otherwise stated.

ning this lesson topic, carefully review the "List
rces". Keep in mind that your learning supervisor
st valuable learning resource. Always feel free
h him if you have problems or questions.

REMOVING AND REPLACING LINE REPLACEABLE UNITS

To learn the material in this lesson topic, you may choos
according to your experience and preferences, any or all
the following written lesson topic presentations.

WRITTEN LESSON TOPIC PRESENTATIONS IN MODULE BOOKLET:

1. Lesson topic summary.
2. Programmed instruction form of lesson topic.
3. Narrative form of lesson topic.
4. Lesson topic progress check.

ADDITIONAL MATERIALS REQUIRED FOR SUCCESSFUL COMPLETION OF LESSON TO

1. Job program in the Job Program Booklet.
2. Student response sheets.
   a. Job data sheet.
   b. Answer sheet for use with test.
   c. Programmed instruction response sheets.

ENRICHMENT MATERIALS:

1. Airborne Search Radar System Training Device (15A21)
   Maintenance Instruction Manual.

All the resources listed above are available and may be
as you see fit. Your learning supervisor represents a m
uable learning resource. Use him when you need help. I
not necessary to use all the resources to achieve the le
objectives for the lesson topic. The lesson topic progr
check is your means of determining when you have achieve
objectives. The progress check may be taken at any time
is graded by you. If you fail to achieve any objective
lesson topic level, you will plan and accomplish your ow
mediation. If you need help in remediation planning con
your learning supervisor.

LESSON TOPIC SUMMARY

REMOVING AND REPLACING LINE REPLACEABLE UNITS

of the MIM for the 15A21 radar trainer contains an illustration
21 airborne search radar system that indicates the location of
units in the system. The removal and installation procedures are
section III of the MIM.

important to observe safety precautions. The primary reason for
safety preacutions is to prevent damage to equipment and injury
el. When removing and installing major units in an avionics
h unidentified cables, they should be tagged to ensure proper
tion of the cable or cables.

ing a major unit from an aircraft a technician visually checks
d major unit for physical damages, bent or broken pins, and
nnectors.

safety wire should be accounted for upon removal from equipment
to prevent damages to the equipment and aircraft or injury to

e for properly installing and securing avionics equipment and
raft equipment is to help prevent damage to the aircraft and
and injury to personnel.

int, you may take the Lesson Topic Progress Check. If you
self-test items correctly, go on to the next Lesson Topic. If
t and use another medium of instruction for the Lesson Topic:
Instruction, Narrative, or consultation with Learning Super-
il you can answer all self-test items on the Progress Check
(achieve Lesson Topic Learning Objectives) and then proceed
t Lesson Topic.

ne organizational maintenance performed on naval aircraft and avionics
ystems involves the removal or installation of units referred to as
ack boxes. As with any maintenance tasks, there are step-by-step pro
edures along with numerous safety precautions that must be followed
efore, during, and after the removal or replacement of major units/ass
lies.

ne technicians first step in the removal or installation of a major u
s to check the MIM for the system and find where the unit is located.
ection II of the MIM provides this information under the "Description
f Major Assemblies." Section II also provides figures, tables, and
aragraph descriptions for each major unit.

ne location of a major unit is provided in section _____ of
IM.

---

hen the location of the unit has been determined, a further check wit
ne MIM is required to find the step-by-step procedures. From the tab
f contents, the removal/replacement installation procedures are found
n section III, paragraphs 3-45 through 3-57. The first part of the
rocedures, paragraph 3-46, describes some of the safety precautions t
e followed during the procedures. After that, each major unit is lis
nd the correct procedures are given to remove and replace/install the
nit properly.

et's discuss the safety precautions and their function during mainte
n the avionics system. The safety precautions should be observed bef
nd during the removal/installation of the major units to prevent dama
o the equipment or injury to personnel. Failure to follow the precau
nd procedures in the MIM can result in aircraft or equipment damage,
ore serious than that, short-cuts bypassing one or two steps could
esult in injury or death to you, the aircrewmen or the ground-support
eople. When all of the safety precautions are observed, the number o
ccidents is reduced. However, if an accident occurs, due to metal fa
atigue, stress, etc., and all safety precautions were observed it is
ne fault of the maintenance personnel. With the high performance air
raft of today this type of accident accounts for only a very small pe
entage of the damage and injuries to personnel. Most of the damage t
ent and the injuries to personnel are caused by poor maintenance prac
nd failure to observe the safety precautions.

nage to equipment and injury to personnel

process of removing or installing the major units, the tech-
l be connecting or disconnecting the interconnecting cables. In
the interconnecting cables will have the cable/plug numbers
them, in one of the following forms: engraved, stamped
metal tags. In some cases, however, the cable numbers have
got lost or have been removed during the repair of the cable. In
, the technician should tag the cable to ensure proper and
ection of the cable when the unit is reinstalled. These un-
cables are the most time-consuming items for the technician. He
o return to the work center for assistance, further information,
onnect them to the wrong connector causing further damage to
system, or himself.

ed cables should be tagged to ensure _____ _____
le or cables.

nstallation

step after the major unit has been removed is to check it
or physical damage; bent, shorted or broken pins and damaged
ctors. A note on the MAF about the physical damage will help ex-
repair of the unit. The note will inform the IMA technician
or replace the damage prior to applying power to the unit which
ent burning up of the test bench or further damage to the in-
ponents of the unit.

fety precaution to be strictly observed during the removal or
on of a major unit is that all pieces of safety wire must be
for. A piece of safety wire left on the flight line or deck,
d up by either propellor or jet blast becomes a projectile as
and deadly as a bullet fired from a gun. From your previous
s with safety wire you found out that the cut ends pierce the
relative ease causing personnel injury, but when the wire is
a moving engine, it could cause the engine to explode, sending
parts outward just like a bomb.

quipment aircraft personnel

uring the installation of a major unit the technician must ensure it
nstalled correctly: all hold downs are tightened, mounts are attache
nd that safety wire is used at the key areas of stress and vibration.
id in the frequent removal and reinstallation of major units many
ifferent types of fasteners are used. Some of these types are:

. Wing-nut fastener.
. Bolts and nuts.
. Screws.
. Turnlock fastener.

he first two (2) fasteners are the most commonly used types and are
o be safety wired each time the unit is installed in the aircraft.
mples of this type of fastener are found in figure 2-3, Display Indi
ower left and right corners.

he proper installation and securing of the major unit may not cause
ystem to work correctly but chances that it will come loose, causing
amage to the aircraft, other equipment and personnel are minimized.

elect the reason a technician should properly install major units in
ircraft.

. Give QA personnel time for other tasks.
. Prevent electrical/electronic failures inflight.
. Ensure the functioning of other equipment.
. Prevent injury to personnel and damage to the equipment or aircra

.

t this point, you may take the Lesson Topic Progress Check. If you
nswer all self-test items correctly, go on to the next Lesson Topic.
ot, select and use another medium of instruction for the Lesson Topi
rogrammed Instruction, Narrative, or consultation with Learning Supe
isor, until you can answer all self-test items on the Progress Check
orrectly (achieve Lesson Topic Learning Objectives) and then proceed
he next Lesson Topic.

PROGRAMMED INSTRUCTION

REMOVING AND REPLACING LINE REPLACEABLE UNITS

INTRODUCTION

maintenance performed on naval aircraft and associated avionic sys
ms involves the removal and installation of the so-called "black
es."

in all maintenance tasks, there are step-by-step procedures as well
numerous safety precautions that must be observed before, during,
after removal or installation of major units/assemblies.

lure to comply with the procedures that are provided in the mainte
ce instruction manual (MIM) for a particular system can result
damages to a system, an aircraft, or associated support equipment.
e serious than equipment damage, short cuts around a step
two in maintenance procedures could cause injury or death to air-
wmen and ground-support personnel.

	1. The technicians first step in preparation for wo on a malfunction, in an avionics system that in- volves the removal or installation of a major un is to check the maintenance instruction manual (for the system.

	system that indicates the location of all m in the system. In the MIM for Device 15A21 an illustratior indicates the location of all major units i system can be found in Section _____.
II	2. Which section of the MIM provides informati the location of all major units in an airborne search radar system. a. Section II. b. Section IV. c. Section V. d. Section I. e. Section III.
a.	3. After determining the location of the unit removed or installed, turn to Section III f removal/installation procedure correct procedures in the mair system and observance of a fev all provided in Sectior III, ges to the radar system and ma

Section _____ of the MIM.

4. Which section of the MIM gives the step-by-step procedures for removal/installation of major units in the airborne search radar system trainer.

   a. Section I.

   b. Section II.

   c. Section III.

   d. Section IV.

   e. Section V.

5. Section II of the 15A21 MIM contains an illustration which shows the location of all major units in the 15A21 airborne search radar system trainer.

   Which section of the MIM provides information about the location of the various major units?

   a. Section I.

   b. Section IV.

   c. Section II.

   d. Section V.

   e. Section III.

c.	6. The primary reason for observing safety precau is to prevent damage to equipment and injury t personnel. Observing safety precautions does mean that all accidents will be prevented. It the number of accidents can be reduced. If all safety precautions are observed and an dent resulting in damage to equipment and/or p sonnel injury occurs because of metal fatique, stress, etc., it is not the fault of crew memb However, accidents caused by metal fatique, st etc., account for a very small percentage of damages and injuries. Most damages to equipme and injuries to personnel are caused by poor m nance practices and failure to observe safety precautions. The primary reason for observing safety precau is to _____ _____
prevent damage to equipment and injury to personnel.	7. Safety precautions should be observed before a during the removal/installation of major units a. ensure the proper operation of equipment. b. ensure that a major unit is properly remov installed. c. complete a task in the minimum amount of t

airborne search radar system trainer.

Which section of the MIM gives step-by-step procedures for removal/installation of major units in the airborne search radar system trainer.

a. Section I.

b. Section V.

c. Section II.

d. Section IV.

e. Section III.

9. Which section of the MIM provides information about the location of the various major units?

a. Section IV.

b. Section V.

c. Section III.

d. Section I.

e. Section II.

10. When removing and installing major units i
avionics system, the technician will be
and disconnecting numerous interconnecti
Most cables have cable and/or plug
or stamped on them. Some may eve

	connected. However, many tags and identifi numbers and letters on cables and plugs are off or lost. When removing an unidentified it should be tagged to ensure proper reinst When removing and installing major units in avionics system with unidentified cables, t should be tagged so as to ensure _____ _____ of the cable or cables.
proper reinstallation	11. The purpose of tagging unidentified cables removing a major unit is to a. ensure proper reinstallation. b. install new unlabeled parts from supply correctly. c. ensure that they are not damaged. d. ensure that they are not lost.
a.	12. The prevention of damage to equipment or in to personnel can be accomplished by observi safety precautions before and during the re installation of major units in an airborne radar system.

during the removal/installation of major units to

a. complete a task in the minimum amount of time.

b. prevent damage to equipment or injury to personnel.

c. ensure the major unit is properly removed/ installed.

d. ensure the proper operation of equipment.

13. Which section of the MIM gives the step-by-step procedures for removal/installation of major units.

a. Section V.

b. Section IV.

c. Section III.

d. Section II.

e. Section I.

14. As a technician you will be required to remove major aircraft units that are found to be defective. The first thing to do after removing the unit is to check it visually for physical damage including bent or broken pins and damaged jack connectors.

	a note of this on the multicopy MAF that will accompany the defective unit to the Intermedi Maintenance Activity (IMA). The information pertaining to physical damage of a major unit help expedite the repairs to the unit. IMA personnel can repair the bent or broken p prior to applying power to the unit which wou probably prevent burning up the test bench or further damage to the internal components of defective unit. Upon removing a major unit from an aircraft avionics system the technician should visuall inspect the unit for _____. _____
physical damage	15. A technician visually checks a removed major unit for _____ (physical damage/shorted components)
physical damage	16. Upon removing an unidentified cable, from a m unit in an avionics system, tag it to ensure reinstallation of the cable or cables.

16. (Continued)

The purpose of tagging unidentified cables when removing a major unit is to

a. install new unlabeled parts from supply correctly.

b. ensure proper reinstallation.

c. ensure that they are not damaged.

d. ensure that they are not lost.

17. Safety precautions should be observed before and during the removal/installation of major units to

a. prevent damage to equipment or injury to personnel.

b. ensure the proper operation of equipment.

c. complete a task in the minimum amount of time.

d. ensure that a major unit is properly removed/ installed.

18. During the removal or the installation of a major unit or aircraft equipment, all pieces of safety wire must be accounted for. Safety wire left on the flight line or flight deck can be caught in a jet blast and become a projectile as deadly as a bullet fired from a gun. It can inflict serious personnel injury or damage to equipment or aircraft.

18. Accounting for all pieces of safety wire wi
injury to personnel and damage to aircraft
associated support equipment caused by thes
pieces of safety wire.

Pieces of safety wire should be accounted f
removal from equipment primarily to prevent

---

damages to equipment and aircraft and injury to personnel.

19. Pieces of safety wire should be accounted f
removal from equipment primarily

a. to be reused.

b. to keep the aircraft neat and to conser
safety wire.

c. because used safety wire must be turned
supply to get new safety wire.

d. to prevent damages to equipment and air
and injury to personnel.

d.

20. When a technician removes a major unit that
defective, the first thing that should be d
to visually check the unit.

A technician visually checks a removed major unit for

a. unit malfunctions.

b. physical damages, bent or broken pins, and damaged connectors.

c. shorted components.

d. equipment security.

21. The purpose of tagging unidentified cables when removing a major unit is to

a. ensure that they are not damaged.

b. install new unlabeled parts from supply correctly.

c. ensure that they are not list.

d. ensure proper reinstallation.

22. When a technician is sent out to the flight line to install a major unit in an aircraft, he must be sure the unit is installed properly: all unit mounts must be attached and tightened down and safety wire must be used in key areas where vibration and

stress are factors. Most major units of a system installed in an aircraft, that must be removed and reinstalled frequently utilize a wing-nut type of fastener. The wing-nut must be safety wired each time the unit is installed in the aircraft. Two examples of this are the Display-Indicator and the Electronic Control Amplifier units in the Airborne Search Radar Trainer, Device 15A21. Figure 2-5 in the MIM depicts this type of fastener.

Proper installation with all cables connected to their proper jacks does not necessarily ensure that the system will work. It is possible to receive a bad unit from supply, or a box may fail to operate properly because of impedance mismatching. However

22. (Continued)

if the unit is properly installed in the system and secured, the chances are minimized of its breaking loose and causing damage to the aircraft, its associated equipment, or injury to personnel.

Properly installing and securing avionics equipment and other aircraft equipment will help prevent damage to _____, _____, and injury to _____.

23. The technician should properly install major units in an aircraft to

a. give quality assurance personnel free time for other tasks.

b. prevent electrical/electronic malfunctions during flight.

c. ensure the functioning of all auxiliary equipment.

d. prevent injury to personnel and damages to the aircraft and equipment.

24. Loose safety wire can become a hazardous missile. Therefore, all pieces of safety wire must be accounted for when removing aircraft equipment to prevent damage to equipment and aircraft or injury to personnel.

	removal from equipment primarily a. because used safety wire must be turned supply to get new safety wire. b. to be reused. c. to prevent damages to equipment and airc injury to personnel. d. to keep the aircraft neat and to conserv safety wire.
c.	25. A technician visually checks a removed major a. equipment security. b. shorted components. c. unit malfunctions. d. physical damages, bent or broken pins, a damaged connectors.
d.	

26.

The technician should properly install major units in an aircraft to

a. prevent electrical/electronic malfunctions during flight.

b. prevent injury to personnel and damages to the aircraft and equipment.

c. ensure the functioning of all auxiliary equipment.

d. give quality assurance personnel free time for other tasks.

---

27. Pieces of safety wire should be accounted for upon removal from equipment primarily

a. to keep the aircraft neat and to conserve safety wire.

b. becaused used safety wire must be turned into supply to get new safety wire.

c. to be reused.

d. to prevent damages to equipment and aircraft or injury to personnel.

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28. The technician should properly install major units in an aircraft to

a. prevent injury to personnel and damages to the aircraft and equipment.

b. ensure the functioning of all auxiliary equipment.

c. prevent electrical/electronic malfunctions during flight.

d. give quality assurance personnel free time for

a. At this point, you may take the lesson to progress check. You may find it benefic review the objectives for this lesson to If you answer all self-test items correc on to the next lesson topic. If not, se use another medium of instruction, narra consultation with the learning supervisor you can answer all self-test items on the gress check correctly (achieve lesson to learning objectives) and then proceed to next lesson topic.